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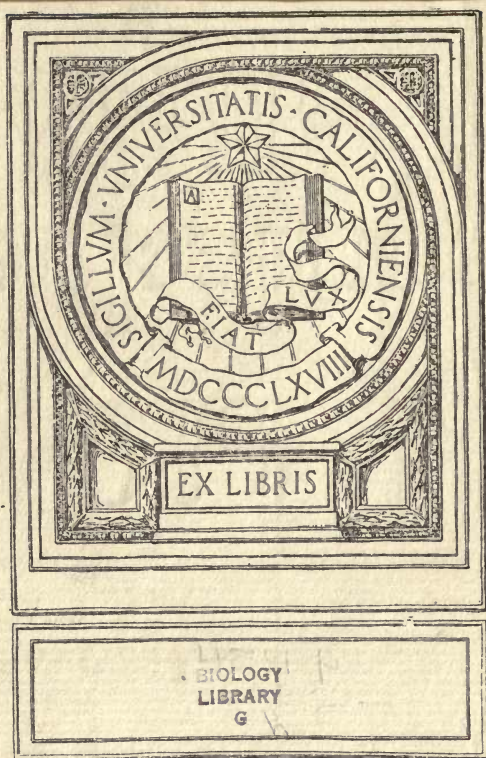
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HEALTH HABITS



O'SHEA and KELLOGG

HEALTH SERIES
of
PHYSIOLOGY and HYGIENE



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THE HEALTH SERIES
OF
PHYSIOLOGY AND HYGIENE

HEALTH HABITS

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OF
PHYSIOLOGY AND HYGIENE

HEALTH HABITS
HEALTH AND CLEANLINESS
THE BODY IN HEALTH
MAKING THE MOST OF LIFE

THE HEALTH SERIES
OF
PHYSIOLOGY AND HYGIENE

HEALTH HABITS

BY

M. V. O'SHEA

PROFESSOR OF EDUCATION, UNIVERSITY OF WISCONSIN
AUTHOR OF "DYNAMIC FACTORS IN EDUCATION," ETC.

AND

J. H. KELLOGG

SUPERINTENDENT OF THE BATTLE CREEK SANITARIUM
AUTHOR OF "MAN, THE MASTERPIECE," ETC.



New York

THE MACMILLAN COMPANY

1921

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The Lakeside Press
R. R. DONNELLEY & SONS COMPANY
CHICAGO

INTRODUCTION

It is the aim in "The Health Series of Physiology and Hygiene" to present in an attractive form for pupils in the elementary school the latest and most accurate knowledge relating to physiology, and especially to the hygiene of daily life. The constant effort of the authors has been to make scientific knowledge so simple, so concrete, and so captivating that pupils can hardly fail to take an interest in the problems of preserving health for the purpose of making the most of life.

Throughout the series, the aim has been kept in view of awakening in the young a normal desire to live in such a manner as to develop strength and preserve health, because in this way the individual will have the greatest success in securing the things which he desires, and in avoiding the disabilities and pains which otherwise are likely to occupy a considerable part of his life. Comparatively little attention is given to anatomy, and only sufficient physiology is presented to constitute a basis for the facts of health which are discussed.

Very extensive use is made of photographs and diagrams illustrating every-day life in the city and in the country. There is at least one interesting and practical original exercise suggested for every principle of health presented

in any lesson, and it is the plan that each pupil should work out each exercise and report upon it during the recitation period. In order further to assist the teacher and the pupil, a list of questions, fully covering the text, has been given at the end of each chapter.

PREFACE

THIS first book of the "Health Series of Physiology and Hygiene" will not be found too difficult for children in the lower intermediate grades of the elementary school. The purpose of the book is to lead young pupils to see that their habits of living determine whether they shall be sick or well much of the time and whether or not they will have strength to do the various things which they want to accomplish.

In the preparation of the book, the authors have studied the typical child from nine to twelve years of age in his daily life. They have noted his tendencies in matters involving health, and they have studied particularly his problems in adapting himself to present-day conditions in the country and in the city. These observations have suggested the subjects pertaining to health which will interest a child and which will be of practical value for him in every-day life. These are the subjects which are discussed in this book.

The authors have further studied children in respect to their attitude toward different methods of presenting facts of health, with a view to determining the child's habits. They have found that the typical child is not much influenced by exhortations simply to live in a healthful way; but he is deeply influenced by everything which promises to increase his energy for his games and plays and which will help him

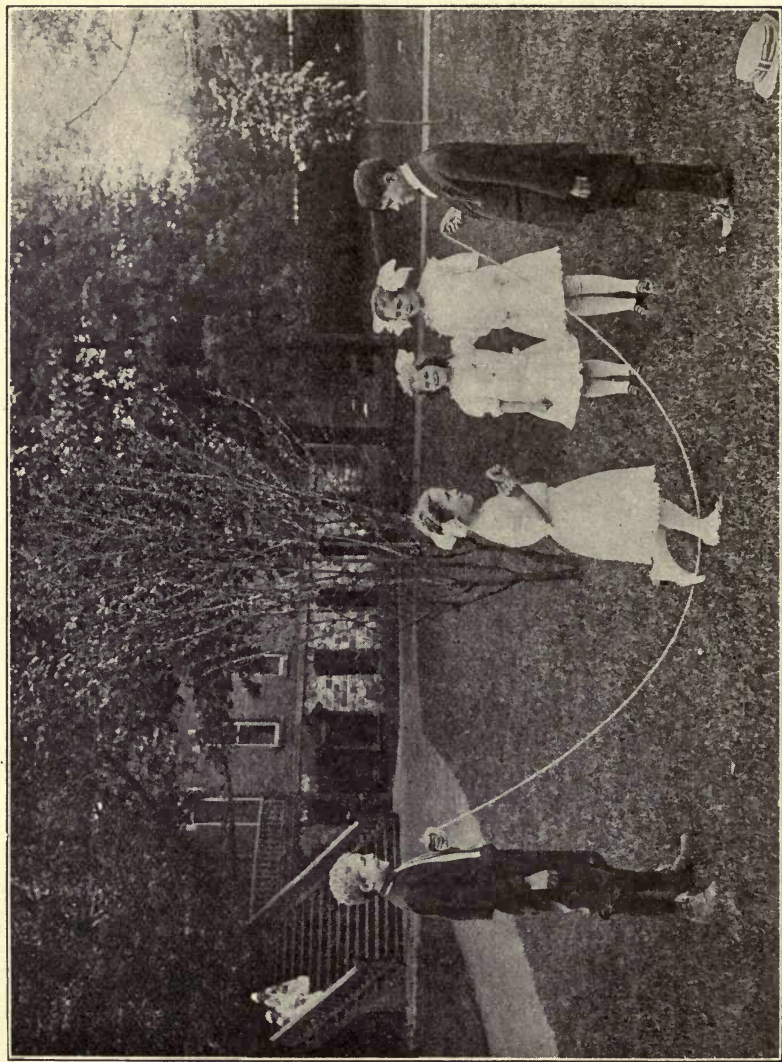
to avoid the pains and sickness. These, he knows, deprive him of the opportunities he craves to be in action all the time and to succeed as well as his rivals in all his undertakings. These traits of children have determined the manner in which the facts and principles in this book have been treated.

The aim throughout has been (1) to use the simplest and most concrete terms; (2) to develop the meaning for any new term before it is given; (3) to illustrate every principle of health by familiar examples and by photographs and drawings; and (4) to have the young become self-helpful in solving practical problems relating to health habits. In order to assist the pupil to keep the points being discussed in mind, marginal headings have been freely used. Lists of questions have been appended to each chapter for the use both of the pupil and the teacher. Hard words are pronounced at the end of the book, and an index has been added so that any one may quickly find any topic in which he may be interested.

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HEALTH HABITS



GOOD HEALTH AND GOOD FEELING GO TOGETHER

HEALTH HABITS

CHAPTER I

WHAT GOOD HEALTH MEANS

WHEN a person is in good health, his whole body is in fine working order. He feels no pains, aches, lameness, or laziness. He feels full of life and vigor. A boy I know said recently that he felt "fine and good all over, and ready for anything that came along."

It pays to
have good
health.

When one does not have good health, the trouble is generally due to lack of proper care of the body, either on the person's own part, or on the part of some one else.

The rose gardener, who every week in the warm weather loosens the soil about his plants, waters them, weeds them, and keeps them free from insects, will have larger and more beautiful blossoms than if he simply left the roses to do the best they could without any care. His bushes will become so strong and hardy that they can endure the frost and the cold when the winter season comes round. But if they were neglected, they would die rapidly.

Any one who takes pains to give his body the right

kind of care every day can be strong and hardy, just as with the gardener's rose bushes. Having good health, one's body may become so full of life and force that it can resist disease, as the strong rose plant can resist the frost.

It pays to have good health. The person who has



IT PAYS TO HAVE GOOD HEALTH.

it will build up a body able to avoid sickness. He will not have to suffer with headache, toothache, earache, boils, coughs, colds, and other ills. When a boy has something the matter with him every now and again, he will miss many pleasures and will fall behind in his work. Think of two people you know, one of

whom has poor health (that is, he has pains or aches of some kind, or he cannot eat or sleep well) while the other has good health. Surely you will find that the latter gets more fun out of life than the former. He can accomplish more with his mind and body. He can do his work with greater ease. He can earn more money. He will probably live longer. He will be more cheerful



Mary
sick



Mary
well

WHICH MARY WOULD YOU RATHER BE ?

and happy. He can therefore give more pleasure to the people around him, and he will be more popular with them.

How many of the people you know have perfect health? I once asked eight hundred young women, students in a college, "How many of you feel well all the time?" Only a few were found who did not have some kind of ache or pain.

Good
health is
possible.

What do you think about the health habits of these girls?

Some people have good health much of the time. Many of us have only a fair average. Ought not



GOOD HEALTH AND GOOD FEELING
GO TOGETHER.

every one aim for a 100 % mark in health, as well as in other things? It is quite possible to live so as to keep our health good. When Mr. Roosevelt was President, he asked Professor Irving Fisher, a teacher in Yale University, to find out how many people in the United States were sick from diseases that might have been prevented. Investigation showed that there were *three million* people in the United States sick all of the time: and that one half of this number (1,500,000) need

not have become ill if they, or some one else, had not carelessly broken the laws of health.

Henry's father made him a present of a fine new bicycle. Its wheels spun round like a top. It did not rattle or creak. So long as Henry took good care of his bicycle, it looked new and fine, and was always ready to give him a good time when he rode it. By and by, he began to neglect his

The valuable gift.

bicycle. He forgot to clean and oil it. It became rusty and dirty. It rattled as it ran. Its wheels turned with such difficulty that it was no longer any fun for Henry to ride it.

Our bodies are in some ways like bicycles. With good care they serve us well, and are so full of vigor that it is not hard to do our best in whatever we undertake.

If some one gave you a valuable gift, would you treat it carelessly and spoil it, as Henry did his bicycle? Or would you take good care of it, and keep it nice as long as possible? Do you not think every one ought to take such care of his body that it will always be in good working condition?

REMEMBER: It is not the weak and the sickly people who win the race, or who have the best time, or who do the most things that are worth while.

HEALTH PROBLEMS

1. Think over what you did during the last summer vacation. Count up the number of days on which no pain or ache interfered with your work or pleasure.

2. Can you tell *why* you were in good health on those days?

3. Looking forward to next summer, would you like to have some "off" days mixed in with the others? Why? Give all the reasons you can.

4. Look at the pictures of strong and of sickly children. Which would you rather be? Why?

5. Do you hear people you know say sometimes that they have a headache or toothache or earache or something of the kind? Could these aches be avoided, do you think?

REVIEW QUESTIONS

1. How does good health make the body feel ?
2. What will good care do for the body ?
3. Will it pay any one to keep good health ? In what ways will it pay ?
4. What loss does bad health cause ?
5. Do most people seem to have good health ?
6. Why are so many people sick much of the time ?

CHAPTER II

HEALTH HABITS

OF course you have often watched the building of houses. Have you noticed that the foundations are usually made of many separate blocks of cement or stone, well fitted together? Have you ever thought that if some of these blocks were left out in places, here and there, or were carelessly laid in, the foundation would be so weakened that the house would be in constant danger of falling down?

The foundations of health.

One's habits of living are the foundation of good or poor health. Like the well-placed stones in the wall, right habits strengthen and harden the body, while wrong habits weaken it and break it down. Even a single bad habit may keep one in poor health much of the time.

Ten-year-old Bertha loved to read stories. Nearly every night she took papers and books to bed with her, and read for a long time, often for hours after every one else in the house was asleep. Her mother, who knew nothing of this bad habit, awoke her at five o'clock each morning. Thus Bertha, who needed nine hours' sleep each night to keep her in good health, often slept no

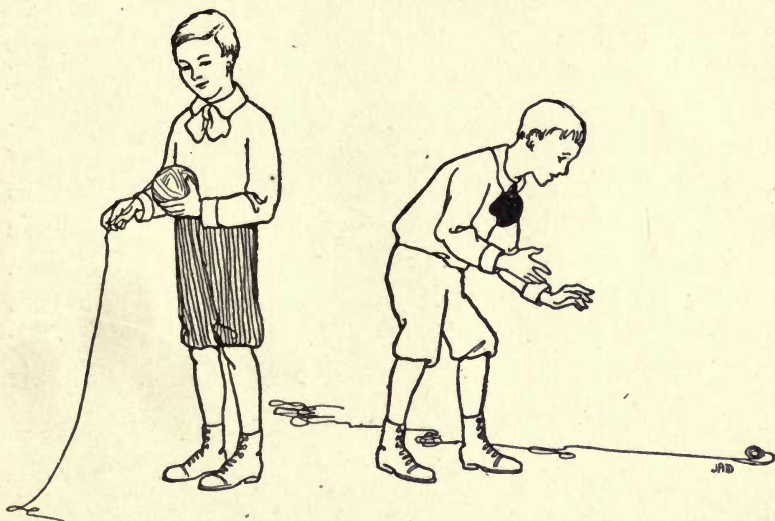
more than five hours. After a time Bertha began to grow thin, to lose her appetite, to have a pain in the back of her head, and to feel irritable and unhappy. Instead of being a help she now became a care to her mother, and an extra expense to her father. Besides, the people around her grew to dislike her, because she was peevish and disagreeable.

Health habits have to do with just such everyday things as sleeping, breathing, eating, thinking, and so on. They have to do also with the way we sit, stand, and move about; with our clothing, and our exercise, and the way we treat the skin, the hands, the teeth, the eyes, and other organs.

We form a habit by doing a thing over and over until it can be done without our having to think about it. **Making habits.** What has been done once is done more easily the second time. If one starts right, it is quite as easy to form a habit which will count on the side of health, as one which will count against it.

To form a habit, one must stick to an action until he can do it without thinking about it. Doing the right thing one day, and omitting to do it the next day, is about as bad a way to live as can be thought of. If a boy every now and then drops a ball of string he is winding, so much string unwinds that he may never get it wound up. So it is with acquiring habits that will make the body strong and hardy and well. We must not forget them until we have so fixed them that they will work whether we think of them or not.

It is important, too, that we start to form good health habits while young. The earlier we begin, the stronger and more powerful the habits will become as we grow in years. If you start a cannon ball rolling down a hill, it will be harder and harder to stop the farther it gets from the starting point. So it is with a



WHAT WILL HAPPEN IF YOU DROP A GOOD HABIT BEFORE IT IS WELL FIXED?

good habit. Is it any different, do you think, with a bad habit? Mention a habit you have observed which ought to be broken, but which the person who has it keeps making stronger?

Roland and Ruth lived with their parents in a beautiful country home, around which grew many fine trees. The children loved to play in the shade of these trees

during the summer time. In the winter, when the leafless branches were covered with icicles or tufts of snow, they thought no fairyland was ever quite so lovely.

Being observant children, they had noticed with regret that while most of the trees were straight and graceful, there were two, a rather large one Correcting]
a habit. and a smaller one, that were so bent they were ugly. The children were delighted one morning when they saw some men preparing to straighten the trees. The men drove strong stakes on one side of the smaller tree in such a way that they could use the stakes to pull it up straight. After much hard work they were able to bring the tree up nearly straight, and then they braced it so that it could not fall back into its old habits. They tried the same plan with the larger tree, but although they worked over it with all their might in every way they knew how, the tree would not yield.

The mother of the children, who was also watching the work on the trees, at last said to the children, "The tree has grown crooked for so long that it cannot be changed now. It is much like a person who has formed a good or a bad habit. When he has got into the habit of doing anything either right or wrong, it is about as hard for him to change as it is for the tree to be straightened. At first those crooked trees were as straight as any of the others, but something bent them just a little, and every time the wind blew, it bent them

a little more, until they became very crooked. If when they were young an attempt had been made to straighten them, it could then have been done easily.

“You should notice too that the strong, straight



BAD HEALTH HABITS MUST BE CORRECTED BEFORE THEY BECOME FIXED.

oaks or maples cannot be bent when they are grown. They have always kept themselves straight, and *their habit of straightness* is so firmly fixed that they will always remain so.”

REMEMBER: When a boy or a girl gets any habit fixed, whether it be a good or a bad one, it is very hard ever to change it. *It is easy to change the course of a small stream, but it is not easy when the stream has become a great river.*

HEALTH PROBLEMS

1. Describe five acts you can perform without thinking about them while performing them. Why are you able to do them so easily?
2. Describe a habit of your dog or kitten that counts for its health. One that counts against its health.
3. Describe three habits in any person you know (but you need not give the person's name) that count for health. Also three habits that count against health.
4. Do you know of any one who sometimes does something he would rather not do? Why does he do it?

REVIEW QUESTIONS

1. What are the foundations of good health?
2. Mention some things which health habits have to do with.
3. How does one form a habit?
4. How can one keep from forming any habit?
5. When should one begin to form health habits?
6. Is it hard to break a bad habit? Why?
7. Is it as hard to change good habits as bad ones?
8. Do one's habits depend somewhat on the kind of companions he chooses? Why?

CHAPTER III

GOOD POSTURE IN STANDING

WHAT do you think it is that makes such a difference in the appearance of these two boys? Is it their *posture*, the way they stand? Notice that *Standing* John stands squarely on both feet. He seems *habits* to keep his body erect without trying. He holds his head up, and his chest out. Both his shoulders are on

the same level.

At times, he enjoys expanding his chest as far as he can with long, deep breaths. His strong, fine carriage makes him look full of vigor, and ready for any game or any task. When I look at him, I



JOHN.



ALFRED.

feel sure that he is the kind of young man who will do with his might and with pleasure whatever he has

to do. Notice how easily and naturally he holds himself in this good position. How is he able to keep it without an effort?

Alfred stoops as he stands. His head droops forward. His back curves outward, and his chest curves inward. One would almost think his chest was behind instead of in front of him. He walks with a careless, shambling gait. Although he is an active lad, he lacks the "ready-for-business" air which John has.

If the two boys were seeking a job, which would stand the better chance? Do you think John's bearing makes him appear more *manly* than Alfred? Do you think he could play a better game, or work harder without getting tired? Why? If they should have a contest of good looks, who would get the prize? The way we hold our body has much to do with our appearance and health. Why?

At a factory where watches are made, one may see timepieces in great variety. The case of each watch is made exactly the right size and shape to hold its working parts, or machinery. To each part is allowed just enough space for its own movement. All the parts working together move the hands around the dial. If by some accident the case of a watch should become indented or bent, it might so decrease the working space of some of the wheels that they could not turn easily, or could run only part way around. As a result, the whole ma-

Cramping
the ma-
chinery.

chinery would be put out of order, and the watch would no longer keep good time, and probably it would stop for good.

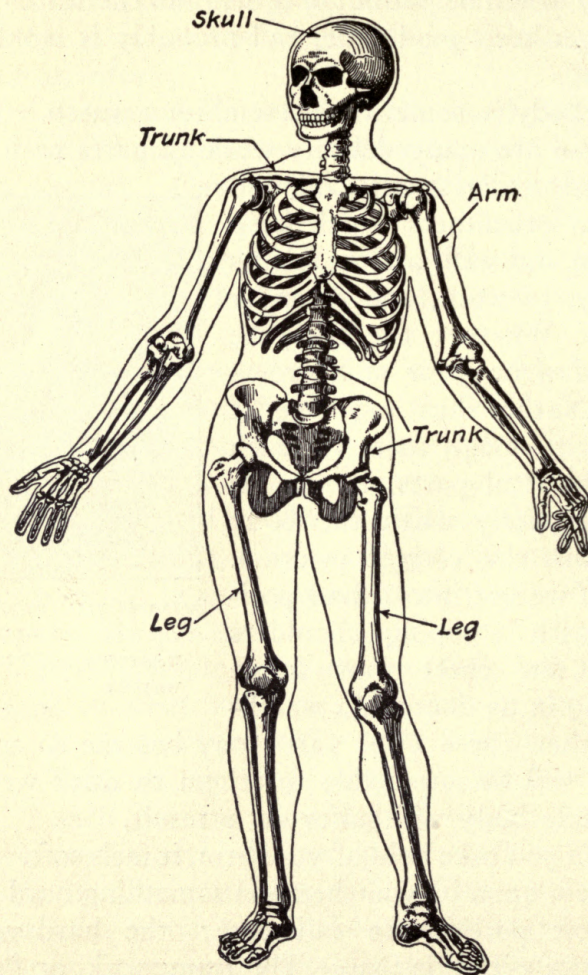
The body in some ways resembles a watch. Within its frame are many delicate working parts with which we breathe, digest our food, and perform other acts which keep us alive and well, and enable us to play, to work, and to enjoy living. Whether the body be that of a baby or of a grown man, Nature has provided it with just enough room for each of these vital parts to do its work properly when the body maintains the correct position. Then if we get into a bad position, with stooping shoulders and a flat chest (our frame pressing in as dents in a watch-case), then these vital parts may become so crowded that it will be impossible for them to work well, and the whole body will suffer as a result.

When you take hold of your arm, it feels soft. But if you press upon it, you then feel something hard inside. The soft portion we call *flesh*; the hard substance within is *bone*. The framework, or *skeleton*, as it is called, by which the whole body is supported is made up of bones, together with two other



SUPPOSE YOU SHOULD BEND
THE CASE IN ON THE WORKS;
WHAT WOULD HAPPEN TO THE
WATCH?

The body's
framework.



THE SKELETON.

kinds of materials — *cartilages* and *ligaments*. *Cartilage* is another name for gristle, a tough substance which you have probably seen in meat. You can feel the difference between bone and cartilage in the upper and the lower part of your nose. *Ligaments* are living cords or bands which hold the separate bones together. These, too, you may have found in meat. The skeleton is composed of not one, but a great many bones,—in all, just two hundred and six. The points at which the bones join are called *joints*.

The skeleton has four divisions, the skull (the bones of the head), the trunk, the arms, and the legs. The trunk forms a bony case to contain and protect some of the most important parts of the body. These parts are called organs, as is each other part of the body which does a special work.

The bones are the hardest parts of the body. When a person is full grown, the bones are very firm and stiff, but in the young child they consist mostly of cartilage. Cartilage is very yielding, and makes it possible for young bones to bend easily.

People often do a baby



THIS BOY WAS NOT PERMITTED TO
STAND OR WALK TOO EARLY.

great injury by trying to make it sit alone, or stand, before its bones have become firm enough to support the weight of its body. Bow legs are often caused by letting a child walk while the bones in the legs are still soft.

From year to year, as the child grows, the cartilage hardens to bone, until when growth is complete, the skeleton is mostly firm bone. If bad positions become a habit with growing boys and girls, the bones as they harden will become misshapen and deformed. Such bones may have to go through life crooked. Do you know any crooked men or women, people with stooped shoulders, or one shoulder higher than the other, bow legs, and so on?

There is in the skeleton a long bony column upon which the head is carried. This is called the *spinal column* or *backbone*. It is not a single bone, but is made up of a row of separate, oddly shaped bones arranged one above the other, with cushions of cartilage between. These bones are so nicely connected that the spinal column can be made to bend with ease in any direction, as the movements of the body make necessary.

Because it can be bent so easily, the spinal column is often made to bend when it should not, or to bend in a wrong way so often, that it becomes crooked. Standing on one leg, standing with the body bent forward when at work or play, sleeping with the head raised high upon thick pillows, are ways through which children often grow out of shape. Girls who take care of a baby often cause their backbones to become

The frame-
work
shaping
habits.

curved, because they carry the child on one arm oftener than on the other. Do you carry with one arm a heavy load of books to and from school every day? If you do, what may be the result of this on your own spinal column? Doing so a few times will result in no injury. But when the strain from wrong positions becomes an everyday thing, lasting hours at a time, or when it is often repeated for even a short time each day, then the soft young bones may yield, and deformity may result.

The boy or girl who wants to take the right standing poise may try To stand this plan: Stand against a wall correctly.

where there is no baseboard, the heels, hips, fingers, and back of the head touching the wall. Now roll the head backward so that you can look directly up at the ceiling, but keep the fingers, hips, and heels hard against the wall. Draw the chin downward and inward till looking directly forward, moving the head without changing the position of the shoulders. You are now nicely balanced on the balls of the feet, and you have the poise which, with slight modifications, one should keep when standing or walking.

Note how you feel when you are standing in a correct position. Observe that the chest is held well up, while the abdomen is drawn in.



HOW TO GET AN
UPRIGHT STAND-
ING POSTURE.

If a person must stand for a long time in one place, he should support the body with one leg while the other is relaxed and thrust forward as in walking, or sidewise, as shown in the pictures. At the same time he should keep the correct poise, instead of allowing the body to



settle down into a bad position. He should make frequent changes, letting one leg rest the other. If he has to carry heavy things, he should make each arm do its share of the work.

The weight of the body should rest on the balls of the feet and not on the heels. When a person looks at his reflection in a mirror, he should see himself standing without effort squarely on both feet, with heels

NOTICE HOW THE SOLDIER STANDS. DOES THIS POSITION MAKE HIM LOOK BRAVE, AND STRONG? WHY?

well in line, and toes turned slightly outward. The arms should be hanging easily at the sides, and the body should be held up straight to its full height. The shoulders should be held easily on the same level and just a little backward. The chest should be high, and the chin drawn inward.

No matter what you may have to do, try to keep in the *upright* attitude. If you stand on the street talking to a friend, or if you stand for recitation in the school-room, try to have the feeling of being *erect*. You will soon get yourself so used to sitting and standing erect that you will establish this health habit, and then constant attention will be unnecessary.

In a military school where all of the boys

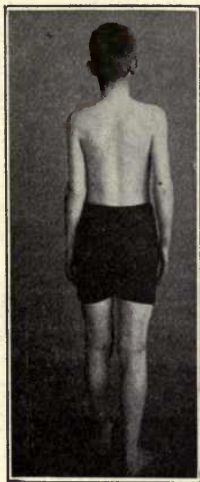
must acquire good carriage,

Be the
watchman
of your
habits.

the new student is watched all day long. He is not allowed to stand, sit, or walk in a bad

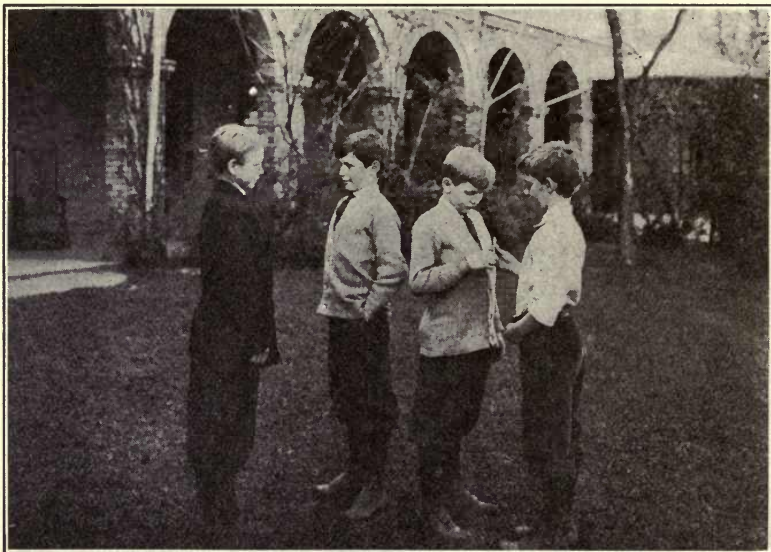
position. With such attention he soon forms the habit of an erect attitude at all times, and so thoroughly is he trained that the habit stays by him all his life. If you will watch yourself as closely as a military student is watched, you, too, may soon become straight and well poised.

Children in some lands are often more erect than children in this country, because almost from babyhood



WHICH OF THESE TWO POSITIONS IS THE BETTER
FOR HEALTH? WHY?

they carry bundles and baskets on their heads. Carrying a book balanced on the head is a good way for a child to learn to stand straight, and to walk erect.



IT IS AS EASY TO KEEP THE BODY ERECT AS TO LET IT GROW INTO BAD SLOUCHING HABITS, AND IT IS MUCH MORE COMFORTABLE.

REMEMBER : That if any one wishes to have a straight strong body, he must, while he is young, get the habit of carrying himself easily erect.

HEALTH PROBLEMS

1. Pick out some one of about your own age who has a very good position when standing. Describe just how this person appears to you. Speak of the way shoulders, head, chest, etc., are carried.

2. Try to see for how many seconds you can continue drawing in your breath when you are standing erect. Try this again when your chest is contracted as is shown in the picture of Alfred on page 13.

3. See how many bones you can count by feeling the various parts of your body.

4. How many joints can you count ?

5. Find a ligament somewhere in your body by feeling.

REVIEW QUESTIONS

1. What is meant by *flesh, bone, skeleton, cartilage, ligament, joint*?

2. What are the four divisions of the skeleton ?

3. What happens to the parts inside the body when one keeps in a bad position?

4. What will happen to a grown person if he gets into the habit of keeping a crooked position ?

5. What is the *backbone* or *spinal column*?

6. How do people get crooked backbones ?

7. How should the weight of the body be supported on the legs ?

CHAPTER IV

GOOD POSTURE IN SITTING

IF you were to make a visit to the home of some of the Fiji Island children, you would find no chairs, for the



NOTICE HOW ERECT THE BODY IS KEPT
WITHOUT EFFORT.

savage boy or girl when tired rests by lying full length upon a mat or upon the ground. The Arab boy crosses his legs in front of him, and sits upon the ground, holding his body as straight as a pine tree. It is the same way with the boys and girls in Japan, India, and many other Eastern lands. Only people of civilized countries use raised seats or chairs.

When civilized people began to make furniture to sit on, they first used stools for seats. But it did not take them long to find out that their bodies became tired when their feet hung down unless they had something

to lean against. So they put a back to the stool, and it became a chair.

The custom of sitting on raised seats is really not so easy and natural as sitting or reclining on the ground or on the floor. Often one sits so carelessly that his back curves backward, his head droops forward, his chest becomes flattened, and so cramped that he cannot breathe deep and full. Consequently, he does not breathe enough air to make him feel well, and to give him liveliness and vigor in all he attempts. Besides, his stomach and other vital organs are forced out of place, and are hindered in their work.

It is quite as necessary to hold the body in an erect position when sitting as when standing, for, as we have already

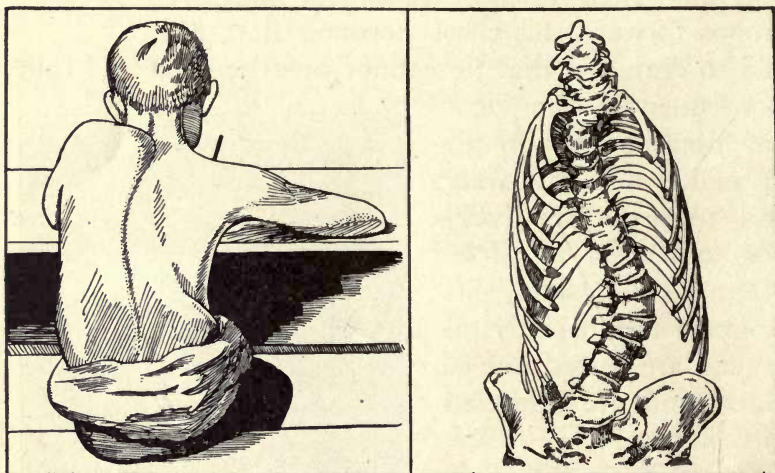
seen, the organs within the trunk of the body have just the right amount of room in which to do their work well when the body is held erect. When a person spends much of his time in any bent-over, doubled-up position, these organs are likely to get crowded out of place; they must then do their work

What a
chair may
do.



WHAT DO YOU THINK OF THIS POSITION?
WHY?

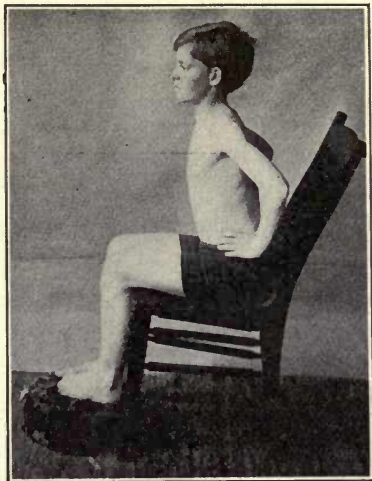
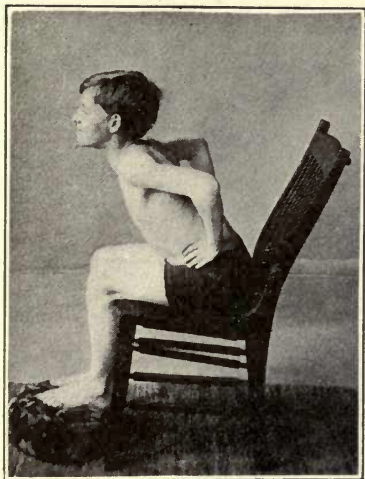
in such cramped-up quarters that it cannot be well done, and their owner feels tired and all out of sorts. Bending the body does no harm, and often does good ; but if the bent position becomes a habit, the parts which hold the organs in place within the trunk become so



A PERSON WHO SITS AT HIS DESK OR TABLE IN THIS POSITION WILL SOONER OR LATER GET A CROOKED SPINAL COLUMN.

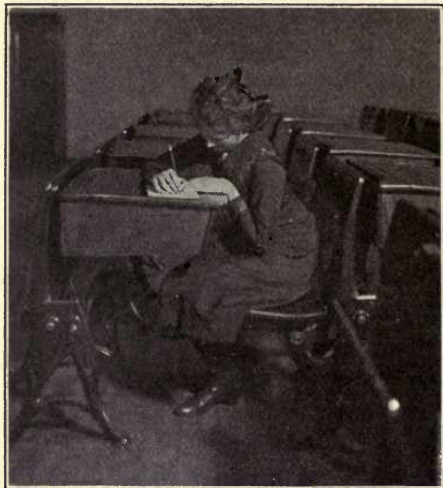
stretched and weakened, that the body may be injured for all time, and serious disease may result. The bones, too, are in danger of becoming misshapen from the bad posture.

Many persons have ugly curves in their backbones, caused by sitting at high desks with one elbow on the desk. This raises one shoulder so high that the spine becomes crooked.



TRY THESE EXERCISES FOR GETTING A GOOD SITTING POSITION. NOTICE HOW THE BOY IN THE LAST POSITION HOLDS THE BODY ERECT IN A VERY EASY AND NATURAL MANNER.

If a young person sits much of the time with the body bent forward, he will after a while become round-shouldered and flat-chested. Why?



PUPILS IN SCHOOL OFTEN HAVE BAD POSITIONS.

WHAT TROUBLE IS THIS GIRL LIKELY TO BRING UPON HERSELF, IF SHE HAS THIS POSITION IN SCHOOL MUCH OF THE TIME?

When one is reading or sewing or doing any other work of this sort, he is likely to sit bent forward. Is it especially hard to keep a proper attitude in a rocking chair? Why?

Be careful not to slide down in your chair if the spine rests against the back of the chair. The farther the hips are from the back of the chair the more out of shape

the body becomes. "When sitting, never lie down," is advice we all should heed.

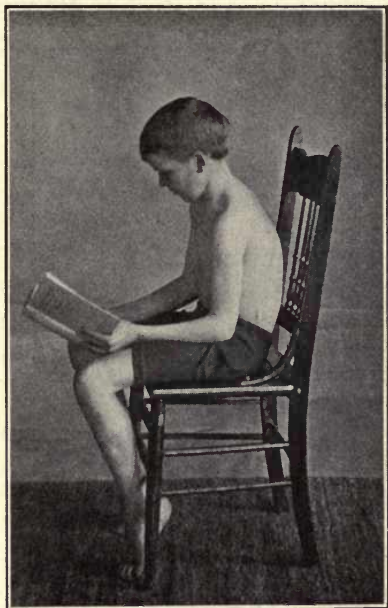
A correct sitting position requires a seat of such a height that the feet can rest easily upon the floor, and of such a width that both hips may touch the back of the chair. A seat that is too low will cramp the legs. With a seat that is too high, the feet cannot reach the floor, and so cannot assist in

The right
kind of
chair.

supporting the body. Besides, the pressure on the soft flesh of the under part of the legs causes them to become numb ("to go to sleep," as we sometimes say). Moreover, the body will slip down in the seat. We have said that this is a bad position. Look at the picture, and you will see it for yourself. Why, then, should all chairs and seats be made to fit the height of the persons who are to use them?

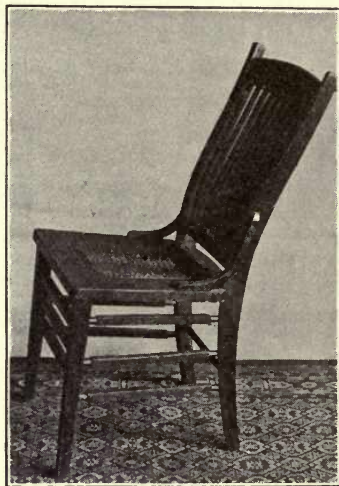
To get a good sitting position, try this plan:

Seat yourself with the hips touching the back of the chair. Place the hands upon the hips with the thumbs on the back as far as possible. Look toward the ceiling, carrying the head back until you are looking straight up. Press the thumbs as hard as you can upon the back, and draw down the chin. You will then have a good position. It will be worth your while to practice this occasionally. Perhaps if you ask your teacher, she will have all the pupils do this once in a while for relief and exercise.



THIS CHAIR IS TOO HIGH. NOTICE THE POSITION OF THE FEET.

To keep the right sitting poise, the chest must be held high. If the hips and shoulders touch the back of the chair as they ought, the spine will of necessity curve inward, as is the case with the boy in the picture. When one sits in a chair with a straight back, he will

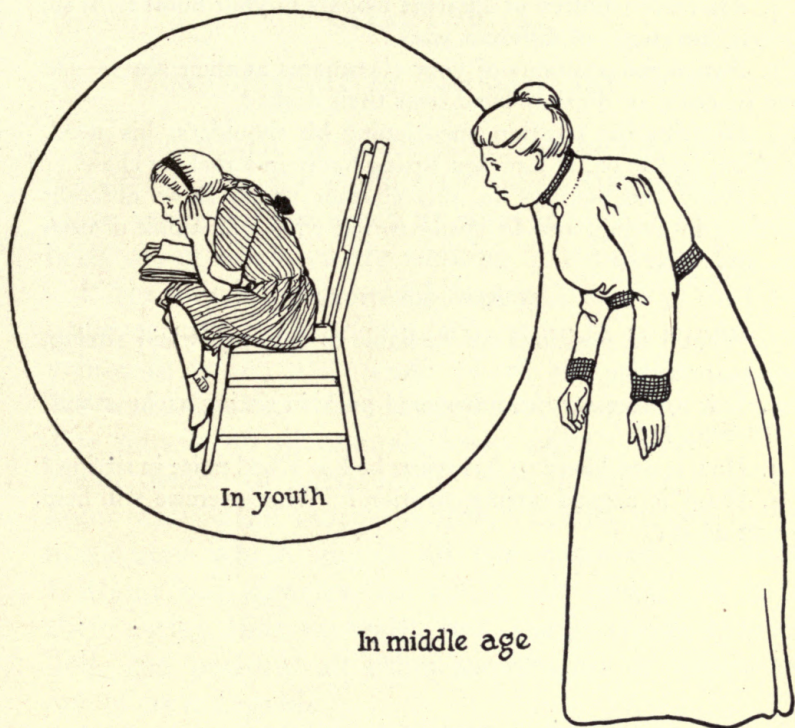


WHICH OF THESE CHAIRS IS THE BETTER FOR HELPING ONE TO KEEP A GOOD POSTURE IN SITTING? WHY?

find it tiresome to keep the correct posture without using a pad or cushion fastened to the chair to support the back. Yet it is better that the chair be made to fit the back when in proper poise.

When one must work for several hours at a task requiring him to sit, it is important that he change his position frequently. Occasionally he should stand, move about for a few minutes, and relax his muscles.

REMEMBER: It will pay in good health, comfort, and efficiency to get the habit of sitting up straight and holding the chest high.



AS THE TWIG IS BENT THE TREE IS INCLINED.

HEALTH PROBLEMS

1. Measure the height of your seat in the schoolroom. Is it just the right height for you?
2. Try this: While sitting, bend forward as far as you can

conveniently, and see how deeply you can breathe. Then sit erect, and see if you can breathe more deeply. Explain.

3. Do the pupils in your room keep their feet squarely on the floor when they are seated? If not, why not?

4. Are there children of different heights in your home? If so, do they use chairs of different sizes?

5. Notice the positions of your classmates at their seats. Do they sit erect, or do they bend over their desks?

6. Describe the position, mentioning his shoulders, his head, his chest, and so on, of a person sitting badly in a rocking chair.

7. Study the pictures in this chapter which show different positions in sitting, and be ready to tell what you think of each one, and why.

REVIEW QUESTIONS

1. What bad positions are we liable to get into when sitting, reading, or sewing?

2. Is it as necessary to have good poise in sitting as in standing? Why?

3. How is one likely to feel when he has a bad poise in sitting?

4. What is a good sitting position? What exercise will help in getting it?

CHAPTER V

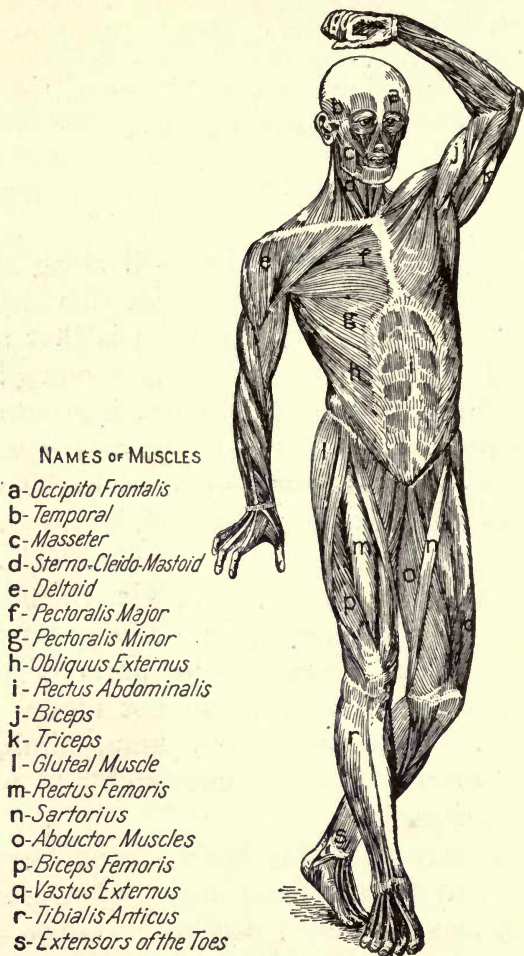
GOOD POSTURE IN EXERCISE AND WORK

As you watch an automobile roll along the street, you know it is the machinery inside that makes it go. Have you ever wondered at what it is that moves the body along when we are walking or running?

If the skin were removed from your arm so that you could see the flesh underneath, some of it would look yellowish white, and some of it red. The ^{Muscle,} yellow flesh is fat, while the red flesh is *muscle*. ^{the moving} The muscle of all animals looks alike. ^{power.} The

“lean meat” of beefsteak is muscle, so most of you know what dead muscle is like. Living muscle is the machinery which moves all the parts of the body. Without our muscles, we could not move. It is by their action that we walk, run, jump, climb, throw a ball, and perform all other movements of which any one of us is capable.

Each of us has in his body about five hundred muscles of various forms and sizes. They are arranged over the bones in such a way as to cover them and make the body plump and shapely. Most of the muscles are in pairs; that is, there are two alike, one on each arm, for instance.



NOTICE HOW COMPLETELY THE SKELETON IS COVERED WITH THE MUSCLES.
 SEE IF YOU CAN TELL WHAT MOVEMENT IS MADE BY THE MUSCLES OF THE
 ARMS, THE TRUNK, AND THE LEGS.

Usually, the muscles are made fast to bones. Between the two bones to which a muscle is tied, there is a joint. One end of the muscle is attached to one bone, the other end to the other bone. Why this arrangement, do you think? But sometimes one end of a muscle is made fast to a bone, and the other end to the skin or to another muscle.

Many of the muscles are not joined to the bones directly, but are made fast to them by means of firm cords, called *tendons*. If you will place the fingers of one hand on the wrist of the other, at the same time working the fingers of the latter, you can feel these tendons moving underneath the skin.

All muscles have the power to become shorter, to *contract*. With your left hand grasp your right arm just in front of the elbow. Close the right hand tightly, then open it several times. You will feel something moving. It is the working of the muscles which shorten and harden when they act, thereby causing the movement which you feel.

Each muscle is a sort of living machine. And one



BY KEEPING THE BODY ERECT
IN WALKING, A HABIT WILL
SOON BE FORMED SO THE
ERECT POSTURE CAN BE KEPT
WITHOUT ANY EFFORT.

curious thing about the machine is that generally the more it works the stronger it grows. Use makes a muscle healthy. It needs rest, of course. But if we would keep a muscle healthy, we must put it to use.

Brisk walking makes a great many of the muscles of the body work. Walking is a splendid health habit, when one walks correctly. But one must keep an



HAROLD.

erect poise. Let the arms swing easily by the side. Walk without bending the knees. In stepping forward, the heel should go down first and the toes point straight ahead like those shown in the illustration. If you will walk on snow or on sand, you can easily make a test of your own way of walking. Many persons walk with their knees bent, but this is neither natural nor graceful. When walking, the strides should not be too long. Each step should have spring in it, as though one felt a joy in every movement. One ought to be as light on his feet

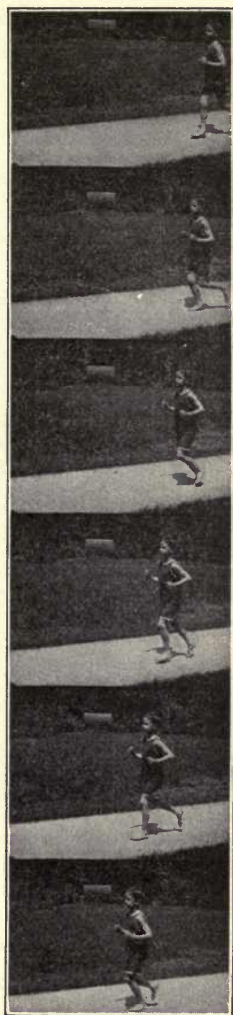
as the lamb, the fawn, or the kitten.

One day Harold, a boy I knew, who was very careless in his walking, was slouching along with his shoulders thrown forward and his head drooping. His cousin,

who owned a kodak, took a snapshot of him. Later the cousin sent this to Harold. Harold could hardly believe it was himself. He made up his mind that he would correct his bad posture, but this he found was by no means an easy thing to do. At first he tried wearing a stiff collar of pasteboard an inch high in the back, and three inches high in front, to make him keep his chin up. The plan he liked better, though, was to walk a mile every day carrying a tray or a basket balanced upon his head.

Running, leaping, and skipping are other modes of using the limbs in moving from one place to another. Running differs from walking in that both feet may be off the ground at the same time, but one is in advance of the other. In leaping, the two feet are off the ground at the same time.

Sometimes, when boys saw wood or shovel snow, they make their backs bend too much. This cramps the organs within the trunk so that they cannot do their work well. Then



STEPS IN RUNNING.

the worker gets tired much quicker than if he kept the body in good poise and bent only at the hips. A glance at the pictures will remind you of various ways in which boys and girls, as well as men and women, frequently assume wrong postures. Can you call to mind other wrong postures. If you will test the matter, you will always

Body
posture
affects
work or
exercise.

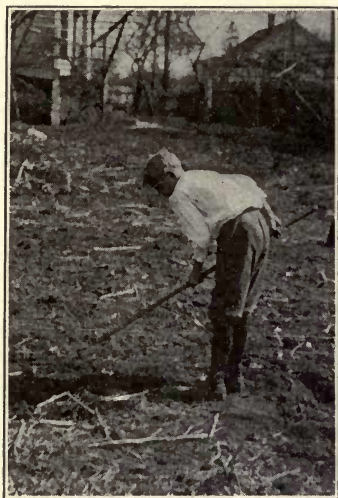


IN WHICH POSITION WILL MARY BE THE MORE TIRED AFTER AN HOUR'S WORK? WHY?

find it is easier for the body to do whatever you need to have it do when you keep it in a correct posture.

REMEMBER: You can walk, run, jump, climb, or do any kind of work easiest and best if you cultivate the

habit of holding the body so that all its organs can do their work without being cramped.



HAS FRED A GOOD POSITION IN
HIS WORK? WHY?



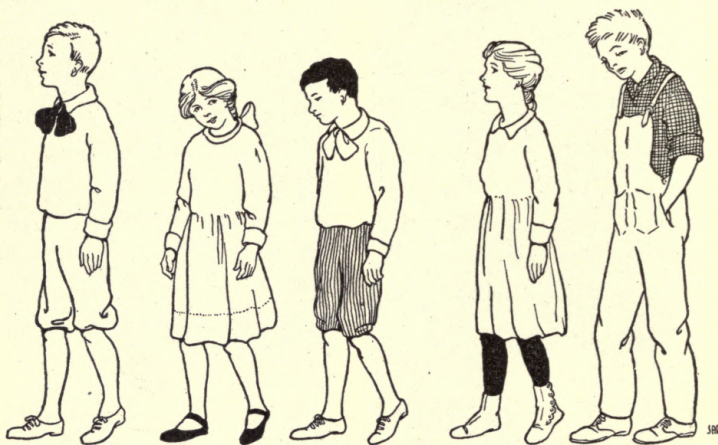
IS THIS BETTER?

HEALTH PROBLEMS

1. Count the number of muscles you can make out by feeling the different parts of your body. What must one do to find some of the smaller muscles that move the fingers, toes, jaws, and so on?
2. Show where the muscles are that are used when you throw a ball. When you pull a rope in a tug of war. When you run. When you jump. When you chew your food. When you rise from your bed in the morning.
3. How many different tendons can you count on your body?
4. What would happen to the muscle in your right arm if you should tie up the arm for one month? Why?

REVIEW QUESTIONS

1. What is it that moves the body when one is walking or running ?
2. How many different muscles are there in the body ?
3. How are the muscles arranged in the body ?
4. What is the arrangement by which the muscles move the bones ?



WHICH OF THESE CHILDREN WILL WALK THE FARTHEST WITHOUT GETTING TIRED ?
WHY ?

5. What is meant by *tendons* ?
6. What is meant when it is said that a muscle has the power to contract ?
7. What is necessary in order to make a muscle stronger ?
8. What is the best position in carrying a pail of water ? In climbing a hill or stairs ?

CHAPTER VI

HEALTH AND EXERCISE

A MAN once made a wager that he could stay still in bed a month, and no harm would come to his health. At the end of the month he found that he had hardly strength enough to stand on his feet. He had thought that lying in bed would rest him, but he found instead that it made him weak. What would happen to one's body if he were to lie in bed all the time ?

Why exercise is necessary.

What will happen to any part of the body that is not used ? If a boy should carry one of his hands in his pocket all the time and never use it, it would become much smaller and weaker than the hand used for all kinds of work. A man I know had to carry his arm in a sling for three months. The skin became shriveled, and the flesh flabby. The bone of the arm, too, became stiff.

A mother who had a baby just old enough to walk lived in a house which was very cold in winter. To keep the baby warm, she wrapped up the child's feet and legs tightly with a blanket, put a warm jacket on her, and kept her much of the time in her carriage. The baby

could use her arms and hands, but not her legs and feet. When warmer weather came, it was found that the baby's feet and legs had not grown so much as the rest of her body. It was a long time before the baby could walk without difficulty.

To keep the muscles strong so that they can do us good service we must *use* them. In other words, we must *exercise*. If you will look at the picture of the muscles, on page 34, you will notice that every part of the body is covered by them. Every part of the body, then, must have exercise that it may be kept strong.

If we exercise but one part of the body, only that part becomes strong. Most persons can lift more with their right arm than with the left one. How do you explain this? Has a blacksmith a strong right arm? Why? People who do not take enough exercise are pale and puny.

The self-
acting mus-
cles and
exercise.

Besides those muscles which make the fleshy part of the body, and which we are able to use at will, there is another kind of muscle which is *self-acting*.

Sneezing and hiccoughing are caused by this kind of muscle, and that is the reason we cannot stop them, however hard we try. The self-acting muscles act when it is necessary that they should, and not when we wish them to.

All the movements of the body are made by means of muscles. The food we eat is moved along from one part of the body to another by means of muscles, and

the blood into which it is finally made is carried to all parts of the body by means of muscles. This occurs when we are asleep, as well as when we are awake, because the muscles which do the work keep right on, even when we do not think about them. The work of the self-acting muscles is wonderful indeed. We shall learn more about them later on.

Exercise benefits both kinds of muscles. It makes the whole body feel fresh, and every part of it tingle with new vigor and power. It gives one a good appetite. It gives him refreshing sleep. He can study better, and he will feel better natured, when he has enough of the right kind of exercise.

One may exercise alike in work and in play. Active play and almost all kinds of work which children have to do, such as chores about the house and How to garden, are good forms of exercise. Brisk exercise. walking, jumping, skipping, mountain climbing, are good ways in which to take exercise. Swimming is splendid exercise. Bicycle riding, when one keeps good body poise, and does not overdo it, is healthful exercise. The joy of moving rapidly over the ground on a wheel often tempts the bicyclist to ride too fast or too long. He may thus be injured instead of helped.

Exercise must be taken *daily*. We need it just as we need food and drink, *every* day. Long walks once or twice a week are good, but are not so good as regular exercise daily. Why? Suppose you should

try to eat in one day all of the food needed for a week. What would the result be ?

We may say there are three kinds of exercise : gentle, moderate, and violent.

Gentle exercise does not make one very tired or out



THIS IS GOOD EXERCISE FOR ANY ONE.

of breath. It is best for weak, sickly, or very old people. Carriage riding and slow walking are gentle exercises.

Moderate exercise, if kept up long, makes one tired but not out of breath. Walking at the rate of three or four miles an hour, light gymnastics, and nearly all kinds of ordinary work in the house, on the farm, in the factory, are examples of moderate exercise.

Violent exercise puts one out of breath and greatly tires him. This kind of exercise should not be overdone. Moderate exercise is best as a rule. Hard

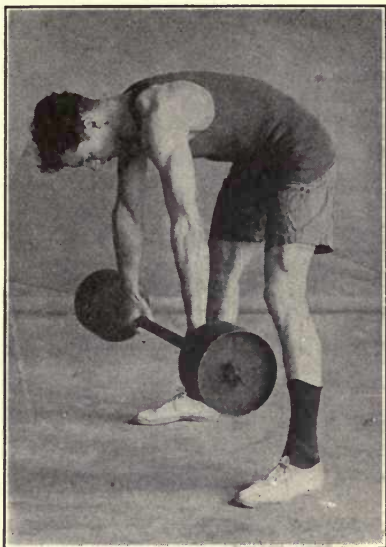
running, hard rowing, fast bicycle riding, hill climbing, most competitive games and athletic exercises are generally violent and should not be indulged in to the point of utter weariness or exhaustion.

If one begins at first with something easy, and every day does a little more, he may after a time be able to stand a great test.

There is an old story of a Roman who one day found a little calf. He took it upon his shoulder and carried it around the ring of a great amphitheater. The next day he carried it again, and so on every day for months. The calf grew in size, but his strength also grew each day. At last he was able to shoulder the full-grown ox, and carry it as easily as he did the little calf.

This he could not have done without the daily practice. How does the point here apply to your own work and play?

To make the muscles grow, we must give them a chance at times to work as hard as they can. Then



BY LIFTING A LITTLE HEAVIER WEIGHT EACH DAY, ONE WILL IN TIME BECOME SO THAT HE CAN LIFT A GREAT WEIGHT WELL.

they will grow stronger and be able to do things yet harder. People who use their muscles vigorously in work out of doors or in playing out-of-door games grow faster and become larger and stronger than those who sit or loaf about indoors most of the time.

Violent exercises, such as running, climbing, jumping the rope, and rapid bicycle riding, do no harm if not continued so long as to make one very much out of breath. Such exercises should be very brief, and should never be continued more than a few minutes at a time without an interval of rest. Moderate exercises, such as walking, simple games, swimming, and out-of-door work, are the best means of developing a strong and vigorous body.

Certain drinks affect the muscles injuriously. When a man takes a drink of beer or whisky, he fancies he is stronger than he was before. But when his strength is tested, it is found that he cannot lift such heavy weights, and cannot do as hard work as he could before drinking the liquor. He cannot play any accurate game, such as golf or tennis, as well. When a man is drunk, his muscles will not work at all, and he seems almost like a dead man, unable often to speak or to move. Why? Because these drinks contain alcohol, which poisons the muscles.

Smoking cigarettes and chewing tobacco also do harm, sooner or later, to the muscles. When a man is training for an athletic team, he is not allowed to smoke or drink beer, wine, or whisky. A boy found

smoking upon the streets in Switzerland is arrested, just as though he had been caught stealing.

REMEMBER: The body grows best by daily exercise in which all the muscles are tested vigorously but not so hard or so long as to injure them. With right practice, harder exercise may be taken each succeeding day.

HEALTH PROBLEMS

1. Find out as many things as you can that are done by your body or within your body which you do not or cannot control by trying to do so. Explain how these acts are possible, though you do not knowingly perform them.

2. Mention ten good ways in which boys and girls from nine or ten to fifteen or sixteen years of age might take exercise in your neighborhood.

3. Make a record of your work during the day. Show when you take exercise.

REVIEW QUESTIONS

1. Why is *exercise* necessary?
2. Do all parts of the body need to be exercised? Why?
3. What would happen to a baby's arms or legs if they were tied up so they could not be used?
4. What is meant by the *self-acting* muscles?
5. Do any of the muscles act while we are asleep? Mention some acts they perform.
6. What are some good forms of exercise?
7. How frequently should exercise be taken?
8. What kinds of exercise should be avoided?
9. How can one increase his strength so that he can do more work every day?
10. What things injure the muscles?

CHAPTER VII

HEALTH AND PLAY

It is natural and right for people to play. The young of creatures all along the line from birds, fishes, **Play is a health habit.** and animals to mankind play together. With animals, play is the means by which they prepare for life. It is nature's school for them. Watch a kitten at play. See it lie in wait, then spring to catch the spool rolling along the floor in just the manner that the full-grown cat leaps upon its prey. Of course you have seen squirrels chase one another 'round and 'round a tree, playing a game that looks like hide and seek.

If games and sports are not played to excess, they are good for every one. Even grown-up people will be helped if they spend some time daily in play.

Active play sets the living machinery, the muscles and all the organs, to work. It helps make the body healthy and strong. Everybody should play, not all of the time, of course, but some every day. He should play just for the fun of it.

One should be reasonable in his play. Do you think one should go to excess in his games just for the sake

of winning? The benefit of play comes not so much in winning a contest, as in playing the game for the pleasure of playing it.

With training, the human body can be made to do remarkable feats. But it is unwise to attempt great "stunts" without special training from some ^{Injurious} one who understands all about the body, and ^{play.} knows just how much yours can safely do. Great injury is often done by overdoing in sports.

Boys not infrequently injure themselves by too violent exertion when they play. Violent running, if long continued, may permanently injure the heart. The writer knew a boy who became so sick as a result of running until he was completely out of breath, that he was confined to bed for several months, and was quite ill for nearly two years. Race horses and even wild animals, when pressed by hunters to violent running, sometimes fall exhausted, and die in a few minutes. It does no harm to exercise hard enough to make the lungs work vigorously; but when one gets so out of breath that he feels through the chest a sense of tightness and pressure which does not quickly pass, the heart and lungs are overtaxed, and injury may be done.

Some of the games so popular among school children do harm when played too hard, because in the excitement of the sport the players overdo. We said in the chapter before this that hard bicycle riding and racing are likely to be injurious, as are long and hard running, rowing, relay races, and similar sports.

The rule is, *play healthfully*. When tired, stop. If you are perspiring at the close of a game, take care

Rules for not to take cold. A good thing to do is to
play. put on another coat, a cloak, or to wrap a blanket about you to prevent the air from chilling the



SAILING BOATS IS FINE SPORT.

body. If no extra wrap of any sort is to be had, it is best to keep moving, walking at a moderate pace until the sweating ceases. Washing the hands and face in cold water will help you to cool off. The very best thing is an all-over bath with cool, not *cold*, water. A brisk rub with a wet towel, a spray, a shower, or a plunge, followed by a thorough drying of the skin with a coarse towel, will usually keep you in good health.

Remember that you must use care not to get chilled before beginning the cool bath, and always while drying rub the skin until it looks red.

Such active sports as can be enjoyed in the open air are best. The outdoor air is better to breathe than

Outdoor the air indoors. In winter, skating, snow-
sports. balling, tobogganing, afford boys and girls fine sport in the open air. During the warmer season hoop rolling, kite flying, and a great variety of games

with the ball, when not played to excess, furnish good sport. One of the best sports is swimming. Every person should learn to swim. It is not only fine sport and a good way to make the body strong and to help keep it in health, but knowing how to swim may sometime be of great service to a person in saving his own life or the lives of others. Learning to swim, like learning to walk, may be a little hard at first, but if we persevere, we shall soon find that our bodies will glide in the water with almost as great ease as we can run on land.

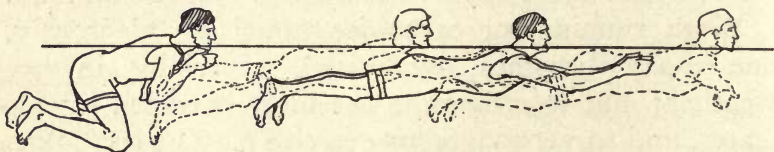
When running, or otherwise exercising vigorously, one easily becomes overheated, especially in hot weather; but in swimming the body is cooled by the water, and so very vigorous exercise may be continued for a considerable time without injury.

One can swim in various positions, upon the front, the back, or the side of the body, and can use a variety of arm and leg movements in so doing. Some ways are best for speed, others are better when one must swim a long distance. Ought one to learn and practice as many of these as possible? Why?

There are various forms of swimming. One of the best is the so-called *breast stroke*, in which the swimmer lies flat upon his breast in the water. The hands are placed together in front and spread out at the side with a backward and downward movement. At the same time the knees are drawn up and then thrown downward while the hands are being brought forward in position for the next stroke as in the picture. It is

easy to learn to swim by the aid of an inflated rubber belt or a cork belt which supports the weight of the body, thus keeping the head out of the water while the proper movements are being learned.

The first thing, of course, is to learn how to keep afloat. You cannot swim without keeping afloat, but you can float without swimming. There are ways and ways of learning to keep afloat, but the chief thing to do is to breathe deep, to have no fear of the

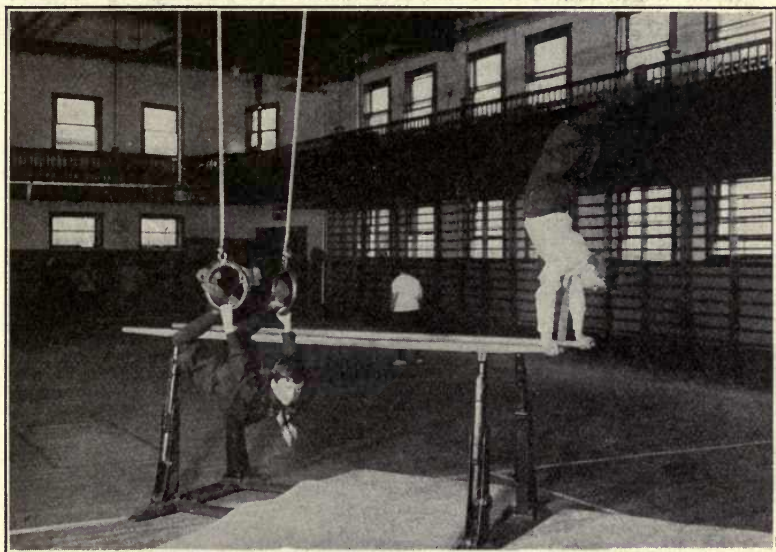


MOVEMENTS IN SWIMMING.

water, and to believe that it will hold you up. One should never hold the breath when learning to swim. It is the air we take in which keeps us afloat. It is best to begin in water not more than waist deep. One should not venture much beyond his depth until he has had considerable practice, and even then it is wise to have a good boat at hand in case of need. But do not be afraid of the water, and with a teacher you will learn to swim readily enough.

After one has the art of swimming well learned, he may turn somersaults in the water, spin around like a top, dive, swim under water, march on the water, undress in the water, and do many other things to add zest to the sport.

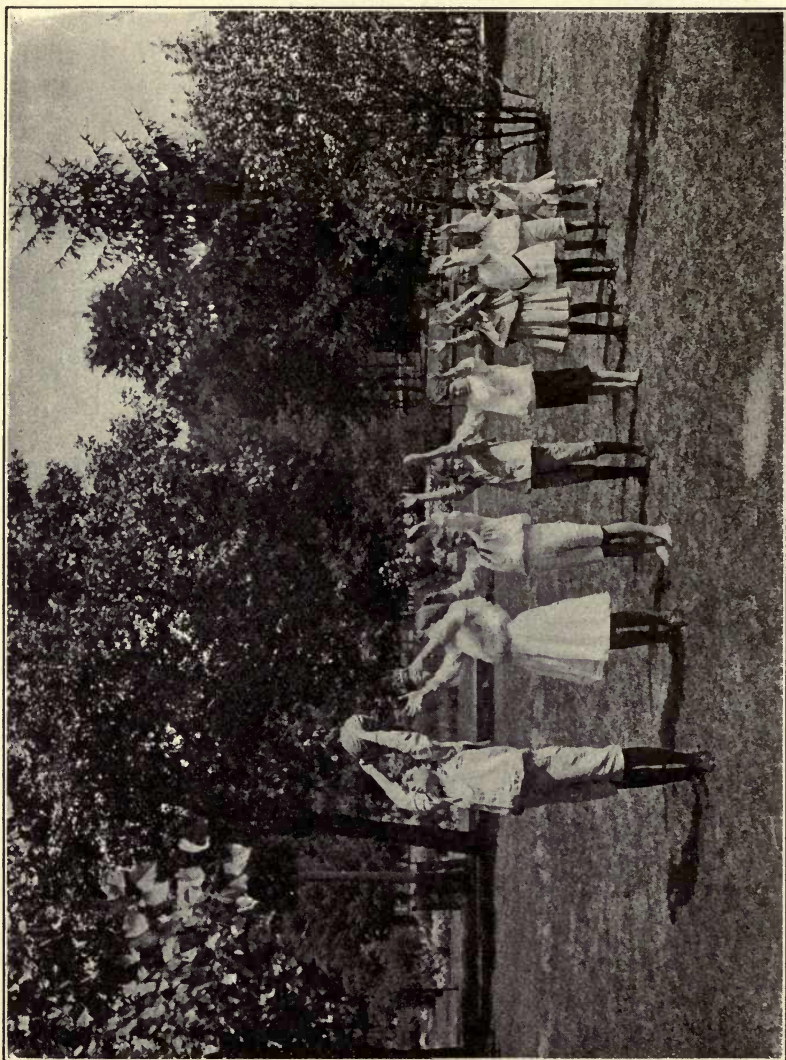
There are numerous playground games and sports, more than a hundred in all, many of which all boys and girls should learn and practice, not merely for pleasure, but also for the benefit which the body derives from these forms of exercise.



INTERESTING GYMNASIUM EXERCISES.

There are also various gymnasium exercises performed with swinging rings, bars, and other apparatus, which may be learned through practice with advantage as a means of developing the muscles and training them to obey the command of the will. Gymnasium exercise.

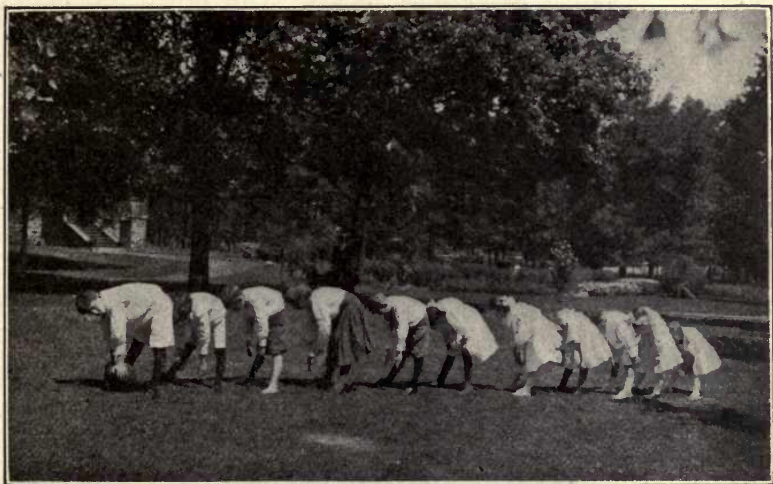
Many hundred years ago the boys of Greece and



FINE GAMES CAN BE PLAYED WITH A FOOTBALL, OR BETTER STILL A VOLLEY BALL. HERE IS ONE SUCH GAME.

Rome played at games in contest. Running, jumping, wrestling, boxing, and throwing the discus were their common sports. To gain a prize meant much practice, much trying the same thing over and over. No doubt they often tired of it, but even though they might not win the prize, they gained in health and vigor of body — really a

Good muscle is built by good food.



HERE IS ANOTHER GAME THAT CAN BE PLAYED WITH THE VOLLEY BALL.

gain of greater worth. To make their arms strong enough to box they had to practice digging in the soil. Their training was particularly strict in regard to food. At one time nothing was allowed but bread, fresh cheese, and figs. These simple foods had in them excellent material for body building, and quite enough of it. On such fare those boys became so strong and

able that the things they could do, the height to which they could vault, the time in which they could make a hundred-yard dash quite surpassed what boys can do to-day. You see that what the body is made of makes a difference in what it can do.

When one is growing, it is especially important to

take nothing into the body but what is useful to it. To eat or drink or breathe in what is in any way harmful, is plainly unwise.

Alcoholic drinks, opium, tea, coffee, and tobacco in every form are things of this sort. There are others too. Can you think of any?

They are poisons and their use checks



ONE SHOULD PLAY GAMES FOR HEALTH AND PLEASURE, NOT MERELY TO WIN.

development, hinders growth, and harms the body in many ways. How many such ways can you think of? Probably what does the most harm, because it is most commonly used, is the cigarette. The boys of ancient Greece and Rome did not use cigarettes; if they had,

they could not have performed the feats they did in their famous games. One cannot do his best at anything while smoking cigarettes. A boy who smokes is like a swimmer who has a stone tied to his neck.

Nature has planned just the right amount of work each organ needs to do to keep the body in health. If in addition to its proper task, an organ is obliged to work to get rid of useless matter like the poison of tobacco smoke or of beer or wine, it is much like making a single engine pull two heavy trains.

A young man who had been a champion tennis player began to smoke tobacco. In a short time he found that persons whom he once excelled with ease could beat him. Tobacco affects the accuracy of the eye and hand, and harms the breathing power, so that one gets "winded" more quickly. It is a poison, a most useless and harmful drug.

This is why the training rules for those on college teams always forbid the use of tobacco for a certain time before the contest.

You can see that by letting tobacco alone one has a good deal to gain and nothing to lose. There is really no good thing that can be said for it.

REMEMBER: Plays, games, and sports are good for the mind and the body, but when they are carried to excess so that they overtax the muscles, heart, and other organs, they are bad for both the mind and the body.

HEALTH PROBLEMS

1. What games do you like best? Why?
2. Have you ever known any one to play too hard? If so, at what game? Why did he play to excess? How could you tell that he played too hard?
3. When you play hard and for a long time, what do you do when you stop?
4. Do you ever feel chilly, or have pain a half hour after you have been playing hard? If so, what is the trouble? How could you avoid your discomfort?

REVIEW QUESTIONS

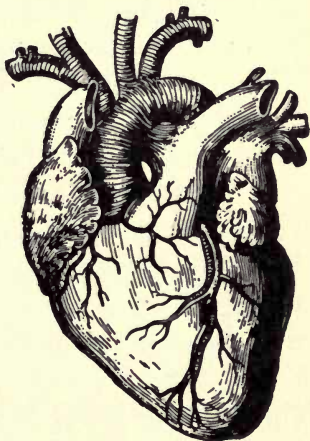
1. Is it natural for the young to play? Why?
2. What good may come from a fair amount of play every day?
3. What dangers should be avoided in games and sports?
4. What may happen from too hard running?
5. When should one stop in a game or sport?
6. What should be done if one is heated after a game?
7. What are good games for winter? For summer?
8. Why is swimming good exercise?
9. What dangers should be avoided in learning to swim?

CHAPTER VIII

SOUND HEARTS AND GOOD BLOOD

AFTER you have been walking fast or running, if you place your hand on the left side of your chest you will feel something beating inside. No doubt The heart's work. you know this is your heart. It beats all the time, although you may not always be able to feel it. During your whole lifetime, your heart never stops beating. If it should cease its work even for a minute, you would die. It does not always beat at the same rate. When you run or jump, the heart beats much harder and faster than when you are sitting down or standing still. It beats most slowly when you are lying down.

Place your hand over your heart, and count its beats for exactly one minute. Quite likely you will find that it beats from seventy-five to eighty times. A baby's heart works very fast, perhaps beating one hundred and forty times a minute. As a person grows



THE HEART.

older, the heart beats more slowly; and in adults the average is about seventy-two beats a minute. Excitement makes the heart beat faster; so does fright or anger. What other things will make it beat faster than usual?

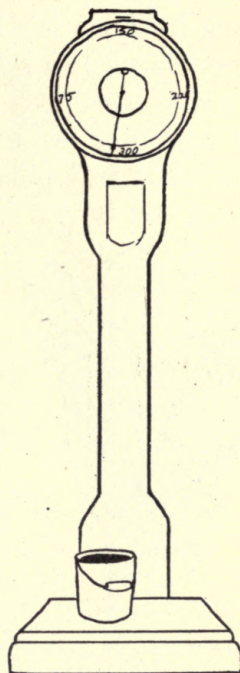
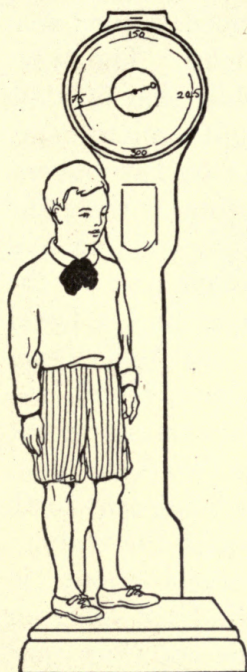
Why does one's heart beat on and on so steadily, every minute, so long as he lives?

We have already learned that the body is all the time needing building material either for growth or for repairs. To provide this material we eat and drink, and breathe in air.

But our eating and drinking and breathing would do us very little good if it were not for the wonderful living stream, the blood, which gathers and distributes to the body the material which builds it up, just when and where the material is needed. This vital stream, besides carrying around the new building materials, also washes away the old and worn-out particles wherever they are found. Could any creature exist without blood? Why?

But this wonderful living stream does not flow on just like a brook or a river. It flows 'round and 'round, or *circulates*, in the body. It is kept moving like the water in the fire hose, — by the action of a force pump. The beating heart is this wonderful force pump. At each stroke or beat it forces twelve ounces of blood into the channels nature has provided for carrying the blood through the body. In one day the heart pumps blood equal to one hundred and fifty barrels. Of course,

no one has that much blood in his body. Only about one thirteenth of a person's whole weight is blood. How much, then, does your blood weigh?



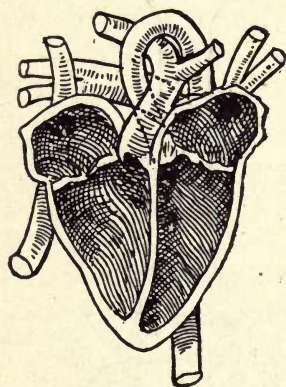
JAM

ONLY ABOUT $\frac{1}{13}$ OF A PERSON'S WEIGHT IS BLOOD.

In its round of service the blood always starts from the heart. The circuit is completed by its return to the heart. The circulation is so rapid that a quantity of blood equal to all there is in the body passes through the heart every half minute.

The heart is a hollow muscle shaped like a cone. Each person's heart is about the size of his fist. The heart of a little babe, then, is quite tiny. A man with a big fist usually has a large heart, because his body is a large one, and it needs a good deal of blood service to keep it in working trim. The heart of a whale is as large as a washtub, while that of some small creatures can be seen only through a microscope.

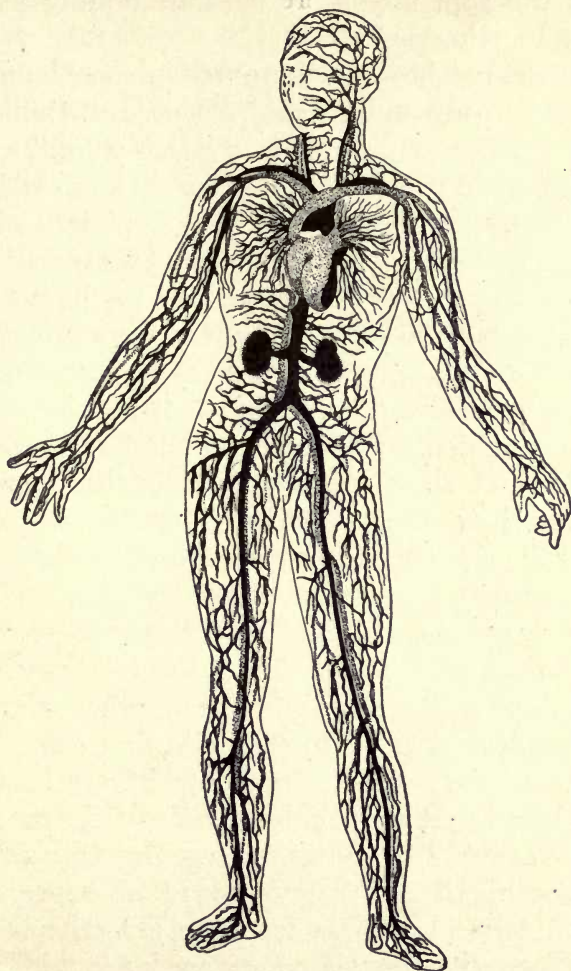
The heart is double ; or rather there are two halves, separate, yet bound together, each beating at the same time, like two boys walking and keeping step. Each part of the heart has an upper and a lower *reservoir*. Into the two upper reservoirs the blood is all the time pouring on its return to the heart. From the two lower ones it is as constantly being sent forth on its course through the body.



THE INSIDE OF THE HEART.

The blood travels about in three different kinds of *tubes* or *blood vessels*. The set that take the blood from the heart are called *arteries*. Those which bring it back to the heart are the *veins*. These two sets of tubes run side by side through all parts of the body. At the ends farthest from the heart they are connected by many tiny tubes called *capillaries*. So numerous and so close together are these capillaries that one cannot stick a pin

The circulation of the blood.



THE CIRCULATION OF THE BLOOD. THE HEAVY BLACK LINES
SHOW THE ARTERIES.

through the skin anywhere without tearing many of them, and letting out blood.

My little neighbor, talking to a schoolmate just outside my open window, said, "I used to think blood was *red fluid*, just as ink is a *black fluid*." "Well, isn't it?" asked the other. "It surely looks red."

"Oh, that's because we can't see it plainly with our eyes," she replied. "The other day I looked at a drop of blood through the microscope, and the liquid had no more color than water, but there were many little round, flat things floating in it. They made me think of reddish colored fish, only they looked more like tiny red plates, or discs, thinner in the middle than at the edge. Part of the time they formed themselves into rows with their sides together, and then they looked like a roll of pennies floating along. They moved around so much I thought they were alive."

The little girl was right. What she saw were *red blood cells* and they were alive. Each one of them leads a separate life as do the fishes that swim in the water or the birds that fly in the air. There are more than a million of them in a single drop of blood. It is their business to take up *oxygen*, which they find in the lungs, and to carry it around the body. Each cell can carry a load of oxygen much larger than itself. These red cells give the blood its color. Yet, it is only when they are laden with oxygen that they are really red. When they have given up their oxygen and are returning through the veins to the

The red
cells in the
blood.

heart, they have a dark purplish color. Why this change in color?

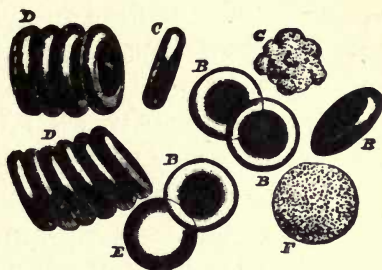
If my little neighbor's eyes had been keen enough, she would have seen a few larger *white cells*, perhaps somewhat different in shape. They are not so easily seen and not nearly so numerous as the red cells, — only about one white to every seven hundred red ones.

The white cells have something to do with keeping up repairs in the body.

As they speed along with the blood they are on the watch, and stop just where they are needed to do any kind of repair work. And there is another thing the white cells do. When, by any chance, disease germs get into the blood, the little white cells capture and destroy them. If the white cells are healthy, and if there are enough of them, they are always victorious in their struggles with germs. Sometimes these brave little body defenders have to battle with such a host that they are overwhelmed, and then the germs may make a person very ill. Whenever the white cells are so weakened they cannot overcome the germs, the body must fall an easy prey to these dangerous foes of life.

The health habits about which we are learning

The warrior white cells.



BLOOD CORPUSCLES.

B, red cells seen from the side; D, red cells seen on edge; F, G, white blood cells.

greatly aid in keeping these watchful little body guards, the white cells, in condition to protect us from disease.

The fluid portion of the blood, in which the white cells and the red cells move, is made up of the water we drink and the food we digest. These are the things which nourish the body. The blood has in it, too, some special substances which when one is in health destroy disease germs. These substances so weaken the disease germs that the white cells can quickly overpower them.

When the body is injured, as when the flesh is cut or crushed, the blood must repair the injury. An injured part is red because it is filled with the blood which has come to repair it.

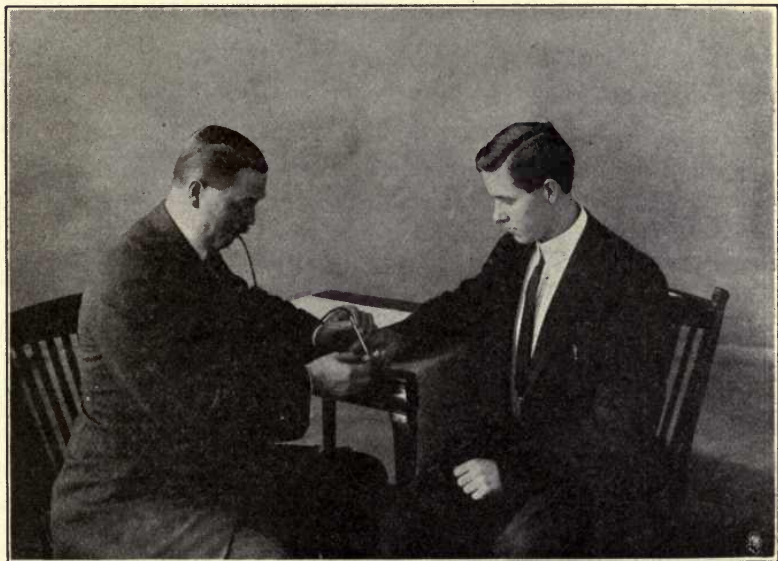
With all there is for the blood to do we can understand why it serves us best when it is made out of wholesome food, pure water, fresh air, and life-giving materials. Poor food makes poor blood, which in turn does poor work for the body. Not enough of food brings about the same result. If the blood is loaded with useless materials, with poisons or unhealthful things, good work is out of the question.

If we should take a drop of blood from the finger of a person who was getting too little sleep, we should find the red blood cells far too few in number. This is one reason why loss of sleep makes a person look pale.

Not very long ago some very interesting experiments were made by a physician upon four young men. From

Importance of good blood.

the finger of each a drop of blood was drawn and carefully examined. All were found to have good, healthy blood. These young men commonly drank only pure water; but on this day they were each given two ounces



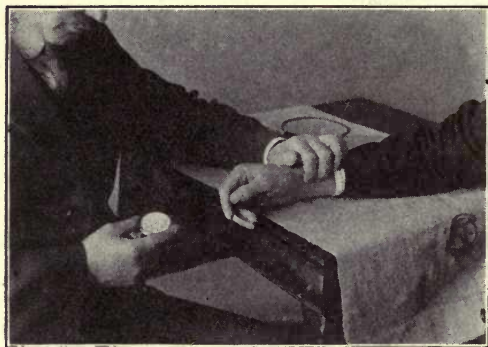
GETTING A DROP OF BLOOD TO SEE IN WHAT CONDITION THE BLOOD CELLS ARE.

of port wine. Two hours later another blood test was made. The result showed that the blood had lost nearly half its power to defend the body against the germs of disease. Another experiment, using two ounces of a patent medicine containing alcohol, with a test four hours after taking it, showed that the blood was injured to a still greater extent.

It has long been observed that persons in the habit of using drinks containing alcohol are usually the first to take such dread diseases as cholera and yellow fever. Another thing has been noticed, that such persons do not recover from accidents and surgical operations so readily as do persons who drink only water.

If a drop of alcohol be added to a drop of blood, it will almost instantly destroy the blood cells. While ordinary alcoholic drinks, such as beer and wine, do not destroy the blood cells so quickly, these drinks injure

the cells, and make impossible the proper work of the blood. The body of a person who is in the habit of using strong drink or other narcotics is like a city whose policemen are all asleep on duty. The enemy is likely to come in



EXAMINING THE ACTION OF THE HEART AS SHOWN
IN THE PULSE.

without resistance. Tobacco, too, unfits the blood for doing its very best work.

Take care
of the
heart!

The heart is an especially strong muscle. It has need to be strong, for though it is small, it must do a great amount of work. In twenty-four hours it does as much work as would be done by a man

in lifting five hundred stones weighing fifty pounds each. Think of it ! and it works at that rate for a lifetime. Never for a moment can its work be laid aside. The small pause between beats gives it some rest. It rests most when we are asleep. Why ?

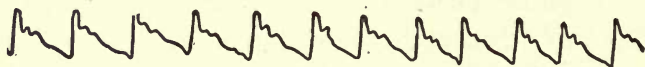
Exercise makes the heart send the blood surging to every part of the body, nourishing it and washing away its waste. This of course is good for the body. But care must be taken to avoid injury to the heart by too violent exercise. We have read that violent exercise, as running so hard or riding a wheel so fast as to get very much out of breath, may injure the heart by overworking it.

It is unwise to overtax the heart in any way. Things other than exercise may strain it. Doctor Parkes, a very learned English physician, took the pains to observe well the effects of alcohol upon the heart of a soldier. He made tests on days when the soldier used no liquor, and again after he had been drinking gin and other strong drinks. He found that when the soldier took a pint of gin a day his heart had to do one fourth more work than it ought to do.

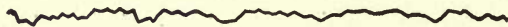
Careful experiments have shown that even a small amount of alcohol may make the heart beat four or five times more a minute than it otherwise would ; that is, 6000 or 7000 extra beats in twenty-four hours. This is as much work as would be required to raise a fifty-pound weight one foot, two hundred and eight times. Besides, the heart has to beat so much more

rapidly to do this extra work that its rest pauses are shorter. Thus it has to do more work even while it has less time for rest.

Is it any wonder that when the use of alcohol gets to be a habit with a person, his heart soon begins to weaken and wear out? Alcohol is a heart poison. It does not strengthen the heart, as was once supposed. It weakens it.



Pulse beat of healthy person.



Pulse beat of tobacco user.



Pulse beat of drunkard.

NOTICE HOW WEAK AND IRREGULAR IS THE HEART BEAT OF THE TOBACCO USER AND THE DRUNKARD.

You can feel the beat of the heart by placing your finger over the large blood vessel on the thumb side of your wrist. We call this beating the *pulse*. If you could feel the pulse of a boy who smokes tobacco for the first time, you would find his heart beating very weakly. This is because he is poisoned. The tobacco plant is one of a family of very poisonous plants. One tenth of a grain of the poison (nicotine) is enough to kill a kitten. Just a small drop under the skin of a rabbit will cause death.

When a person has the habit of smoking any form of tobacco in excess, his heart is weakened, and beats a good many more times a minute than the proper number. It may beat even so rapidly as 112 times a minute. Think what a lot of extra work such a heart must do. The extra beats are labor lost, and tend to wear out the heart. After a while it gets so tired that it cannot force all the blood needed to every portion of the body. Then the whole body rapidly becomes diseased.

You would think it rather funny to see a rabbit smoking. A learned Russian man fixed up an apparatus by means of which he compelled rabbits to breathe the smoke of cigarettes for six or eight hours every day. Some of them died within a month, while others seemed to get used to it, just as human beings do, and did not die at once. But at the end of five months it was found that their blood vessels, which in health are soft and elastic, had become hard as pipe stems. When the arteries harden they become shriveled, and many of the small ones are thus closed. This is what occurs in very old age. A boy of seventeen who died from cigarette smoking had arteries as hard as those of a man a hundred years old. Tobacco causes the body to become old while it is still young in years.

Other poisons, among which are opium, morphine, caffeine, and cocaine, do similar damage to the heart, blood vessels, and blood. Do you think it wise to avoid the use of all such things?

A sound heart is necessary to a healthy and a long life. A person without a strong, vigorous heart is as poorly fitted for the voyage of life as a ship would be to cross the Atlantic with a disabled engine. Any one who knowingly weakens his heart is like a captain who purposely disables his engines when he knows he has to make a long ocean voyage.

REMEMBER: The heart is to the body as the main-spring is to a watch. Every organ depends upon its healthy action. Do not overtax it or weaken it by alcohol or tobacco.

HEALTH PROBLEMS

1. Does your heart beat while you are asleep? How can you tell?
2. Can you tell whether the stream of blood goes up into your head, out into your hands, and down into your feet? How?
3. Put your finger on an artery and then on a vein in your wrist. What is the difference, in the way both feel to you, between a vein and an artery?
4. Why do the blood cells carry oxygen? Where do they get it?
5. Have you noticed that when you hurt any part of the body, or when any part of it is sore, there is usually a swelling about the place? Explain this.
6. Why does the heart beat more rapidly after a man takes a stimulant than it did before?
7. Why does it beat so rapidly when one has a fever?
8. Why does the doctor always feel your pulse when he is called to visit you because you are sick?

REVIEW QUESTIONS

1. On what side of the body can you feel the heart beat ?
2. How can you make the heart beat hard and fast ?
3. When does the heart beat slowest ?
4. How are the materials needed for building and repairing the body carried around to different parts ?
5. How are the worn-out materials removed from the body ?
6. How much blood does the heart pump in one day ?
7. What part by weight of one's body is his blood ?
8. How is the heart constructed ?
9. Describe the reservoirs in the heart.
10. What is the use of the capillaries ? the veins ? the arteries ?
11. What gives the red color to the blood ?
12. What do the red blood cells do for the body ? the white cells ?
13. How does the blood get the fluid in which the cells are carried about ?
14. How can one best keep his blood good, so that it can do its work ?
15. How does too little sleep affect the blood cells ?
16. How does alcohol affect the blood cells ? tobacco ?

CHAPTER IX

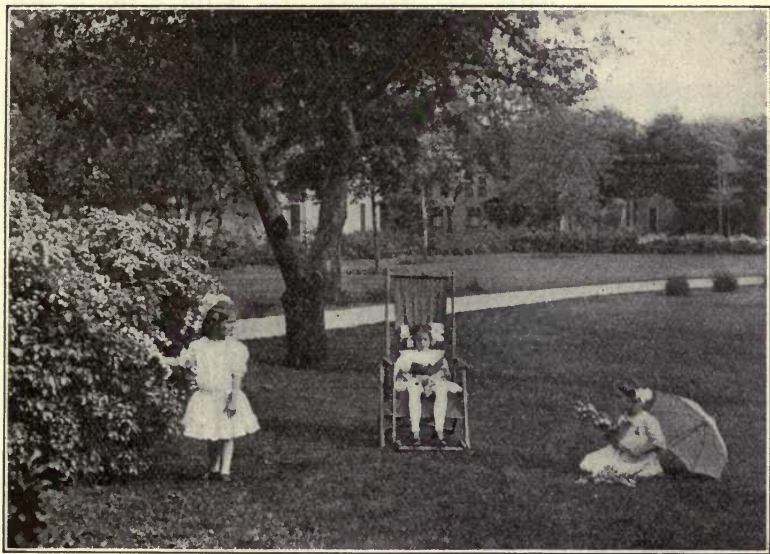
OUTDOOR LIFE

Most people like to be outdoors. This is natural, for we were made to live out-of-doors. Man's first home was a garden, and his first occupation **Pure air.** was outdoor work. Out-of-doors the air is fresh, it is cleaner and there is plenty of it. Indoors there is only as much air as the house, with all the other things it contains, can hold, and so the air is not usually fresh nor very clean.

There is always some dust in the air, but indoor air contains several times as much dust as does that out-of-doors. The leaves and grass and plants, because they are moist, catch and hold much dust so that it cannot fly about. The snow and the rain wash the dust to the earth, and so clean the air. The winds, too, often help to make the air cleaner. Indoors we lack these aids in cleaning the air. And our carpets, rugs, curtains, and other household furnishings are so dry and fuzzy that dust clings to them. Then, when people move about the rooms, some dust is shaken off, and goes swirling into the air for us to breathe.

Not all dust is harmful, but much of it is. And since we cannot tell beforehand whether or not it is harmful,

it is important that we try to breathe the air which we know has the least dust in it. Men of science who have made a study of this matter have found that house dust is especially dangerous to health. It often helps to



HOW MUCH BETTER IT IS TO STUDY, READ, AND PLAY OUT-OF-DOORS
THAN IN THE HOUSE !

bring on those dreaded diseases, *pneumonia* and *tuberculosis*, so often, indeed, that these diseases are called *house diseases*. It has been found that the very best way to cure them is to live out-of-doors, — to breathe outdoor air all the time.

If breathing fresh air will often cure such diseases as pneumonia and tuberculosis, do you not think that

breathing this air would be one of the very best ways to keep from getting these diseases? In the warmer seasons, one can play, work, and study out-of-doors. He can spend a good deal of time on the porch, or on the roof, or on the lawn. If we live in a village or in the country, this will be easy to do. But in a city it may



EVEN IN WINTER, ONE OUGHT TO BE OUT-OF-DOORS A GOOD DEAL.

be more difficult. This is one reason why the country is usually better for health and good spirits than the city.

Even in winter we should each day spend an hour or two out-of-doors. Brisk and vigorous exercise will keep us from minding the cold. The cold, fresh air of winter is even better for good health than the warm air of summer. Why should this be so?

Of course one cannot neglect things indoors which must be done, but when one makes plans for it, he can take much that is commonly done indoors out into the open air.

In some places there are open-air schools. In the cold season the pupils are kept comfortable by warm



WHICH WOULD BE BETTER, TO PLAY THIS GAME INDOORS, OR TO PLAY IT OUTDOORS?

over-garments, caps, and gloves, with their feet and legs in what is called a "sitting-out bag." In other schools, suits like those worn in the cold North by the Eskimo children are used. The children think it great fun to have school out-of-doors, and they seem often

to learn faster and easier than when they study indoors. Why, do you think ?

If we cannot well go to such a school, there is at least a way for us to get a good supply of clean outdoor air,

Sleeping

in the

outdoor air.

— and that is to sleep in the open air at night.

To breathe fresh air while we are asleep is one of the greatest aids to keeping good health.

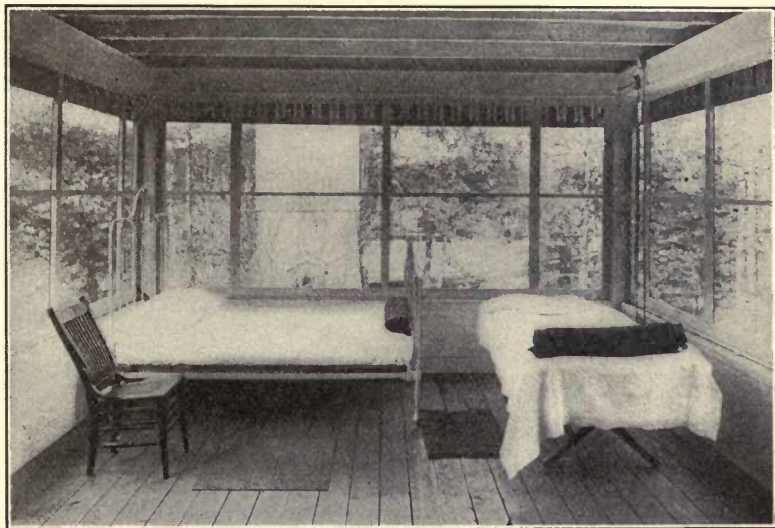
Sleeping out-of-doors is a splendid health habit, and many people are now doing it in the city as well as in the country. These people always say they feel better when they sleep out-of-doors than when they have to sleep in bedrooms. Can you explain this ?

Many people have sleeping porches on their houses, while others sleep in screened tents in the yard, or on the roof. Many who cannot do this use a window tent or a fresh-air tube. One can at least sleep with windows open, and thus get a good deal of fresh air. Any one who has tried it knows it is a joy to sleep in the open air in summer.

It is great fun in winter, too, if one goes about it right. For winter the night garments must be light in weight, but very warm, and must fit somewhat snug, so the cold air cannot get near the body to chill it. The cold air is for the lungs only ; the rest of the body should be warm while we sleep. We cannot depend for warmth upon bedclothes laid on in the usual way. It would take so many to keep the body warm that their weight would tire the sleeper.

The best way to do is to have a sleeping outfit to put

on each night, just as we have overcoats, caps, and mittens, when we go skating. This may cover the body all over, except the nose, if desired. The nose needs to be left out, of course, so that one can breathe the cold



AN OUTDOOR SLEEPING PORCH; OPEN ON THREE SIDES.

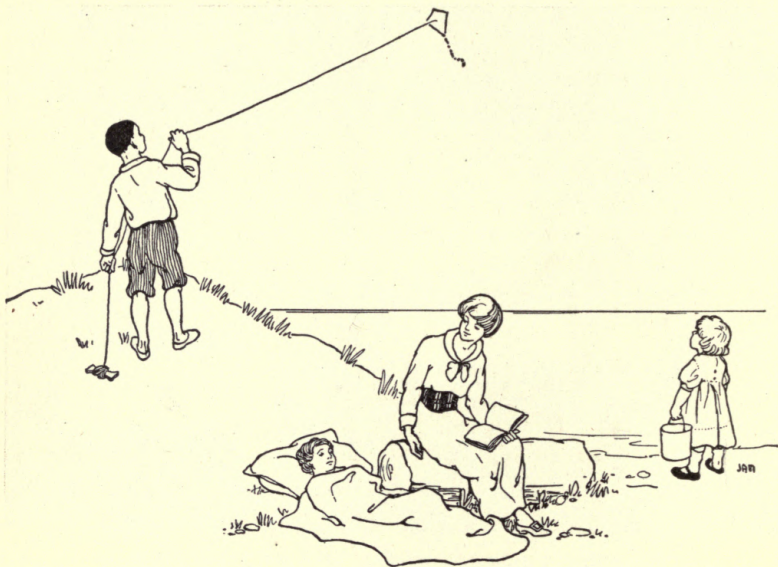
air. Most people enjoy leaving the whole face uncovered to the cold air.

First, the bed should be warm. It can be made so by placing a jug of hot water upright, so that the covers form a sort of tent over it, and leaving it there for an hour before bedtime.

There are electric blankets by which a bed may be made warm and kept warm for the outdoor sleeper, or

the bed clothing may be warmed indoors, and the bed made up when needed.

Creep into a *warm* nest, prepared to sleep *warm*, and after a night spent thus in the cold air you will feel as



THE SICK AND THE WELL, THE YOUNG AND THE OLD SHOULD BE OUT-OF-DOORS
AS MUCH AS POSSIBLE.

fresh in the morning as you do when you have been out coasting, skating, or sleighriding.

REMEMBER: If we want to live long and keep our health good, we must spend much time out-of-doors while young, and when older choose for our life work if possible one that will keep us much in the open air.

HEALTH PROBLEMS

1. Is there very much dust floating in the air in your school-room? Mention some way to find out whether there is much dust in the air of a room.

2. Tell how dust can be kept out of the schoolroom, and out of rooms in your home.

3. If you live in the city, tell how you would keep the streets from being dusty. If you live in the country, say whether the roads are very dusty, and if so, how the dust could be reduced.

4. Do you know any one who sleeps in a room with the windows all closed? If so, does he have good health all the time? Does he have colds and coughs?

5. Ask some one you know who sleeps out-of-doors to tell you what he thinks of it, and give a report to the class.

REVIEW QUESTIONS

1. Is it natural for people to like to be out-of-doors? Why?

2. Is the air better out-of-doors than indoors? Why?

3. Why is there likely to be more dust in the air indoors than outdoors?

4. Is dust liable to harm good health? Why?

5. What are the *house* diseases? What may cause them?

6. How much time ought one to spend out-of-doors?

7. What could one gain by sleeping out in the open air?

8. If one sleeps out-of-doors in winter, how may he keep his body warm in the coldest weather?

CHAPTER X

FRESH AIR INDOORS

A PERSON may go without eating for a month, or without drinking for several days, and still live ; but if a strong man were deprived of air, he would die in a few minutes. We have seen that the best air is outdoor air. What time we must be indoors we should try in some way to get enough pure out-of-door air to breathe.

There are several ways in which air is made impure. We have seen that dust makes air unhealthful.

How air becomes impure. Anything that rots or decays soon gives forth a bad odor. Some people have rotting potatoes and other vegetables in their cellars, and swill barrels and garbage heaps at their back doors. All these spoil the air. Bad odors in the air from decaying stuffs are signs of danger, and we should see to it that rotting things, whatever they may be, are taken away from the house or yard as soon as possible.

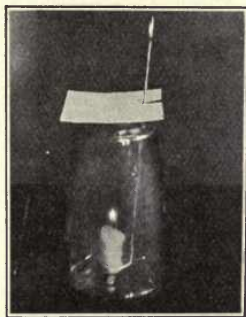
The chief reason why both dust and bad odors are harmful is that they generally carry with them little living things called *microbes* or *germs*. These are so small that they cannot be seen by the naked eye. It

takes a strong microscope to make them out. There are a good many kinds of them, and some of them are so powerful to do us harm that if we receive them into our bodies they are likely to make us ill, and they are often the cause of death.

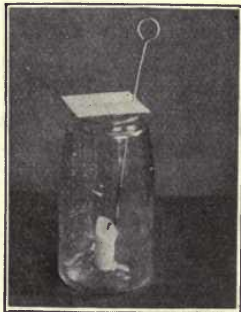
Another way in which the inside air is made impure is through a change which comes to it from the breath-



THE CANDLE BURNS
BRIGHTLY.



IT IS DYING DOWN.



IT IS GONE. WHY?

ing of people and animals, and the burning of lamps and fires in the house.

We can easily prove this fact by a simple experiment. For this we shall need a fruit jar, a candle, and a piece of wire about a foot long. The candle is fastened to the end of the wire and let down into the bottom of the jar. Now we will place the cover on the jar and see what happens. You notice that the candle soon begins to burn dimly, and before long it goes out altogether.

Why will the candle not burn in the closed jar?

Try the experiment again, and when the candle light begins to get dim, bring it out at once into the air. What do you find? Explain the facts which your experiment shows you.

What is the result when the stove draught is shut tight? The fire soon burns low; and if the draught is left closed, the fire will go out. The wood or coal in the stove needs air to keep it burning, just as the candle needs air. Why will fire not burn without air? Why do animals need air to keep them alive?

If instead of a candle we should shut up a mouse in the fruit jar, it would live only a little while. Its life would go out, just as the light of the candle went out, for lack of air. A child shut up in an air-tight box or small space would soon die from the same cause.

Something besides heat comes from the burning of wood or coal. The smoke escapes through the chimney, and the ashes remain in the stove; these are the waste parts of the fuel.

A kind of burning or combustion, as it is called, is all the time going on in our bodies. This burning produces something quite like the smoke and ashes made by the fire in the stove. What is like the smoke is a gas called *carbon dioxide*, which escapes from our body into the air about us every time we breathe. In this gas is a kind of poison that spoils the air of the room, and makes it smell musty.

We cannot see this gas, but we can make an experiment which will show us that it really does pass out of

the body. Get a drinking glass, and a glass tube or a good stout straw. Into the glass put limewater, such as you use for your teeth. Breathe two or three times through the tube or the straw into the limewater. You will notice that it begins to look milky. Soon it is



YOU SEE WHAT CHANGE TAKES PLACE IN LIMESWATER WHEN YOU SEND YOUR BREATH THROUGH IT. EXPLAIN.

almost as white as milk. This is because the limewater catches and holds the *carbon dioxide* which we breathe into it.

Every time we draw in a breath of pure fresh air, the body keeps and uses some of the oxygen, and in its stead breathes out carbon dioxide. So each time we

breathe out we make the air around us impure by the breath we expel. If we are out-of-doors, fresh air is so plentiful that the foul air from the lungs is carried away. But if we have only a room full of air on hand, we shall soon be breathing poisoned air unless we have some means of getting a supply of fresh air all the time.

We spoil at least half a barrellful of air at each breath. Count how many times you breathe in a minute, and then reckon up how many barrellfuls of air you need. You

We spoil ten barrel-fuls of air a minute. breathe twenty times in a minute, and so you spoil ten barrellfuls of air each minute. Now see how many barrellfuls this would make in

one hour. We need pure air to take the place of the spoiled air, ten barrels of fresh air every minute, or six hundred barrels every hour. To get the fresh air we need, the air about us must be in motion all the time.

If one were in a closed room into which no fresh air could get, and the air were *dead*, as we say, it would become so impure that the person in the room would be poisoned to death. Many years ago when the British people were having war with India, one hundred and forty-six English soldiers were taken prisoners. Their captors thrust them into a room twenty feet square. It had two very small windows, but the amount of air that could trickle in through these did not begin to be enough for so many soldiers. In a very short time the oxygen had been used from the air, and the soldiers began to suffer great torture. By morning only twenty-three of the whole number were alive. This

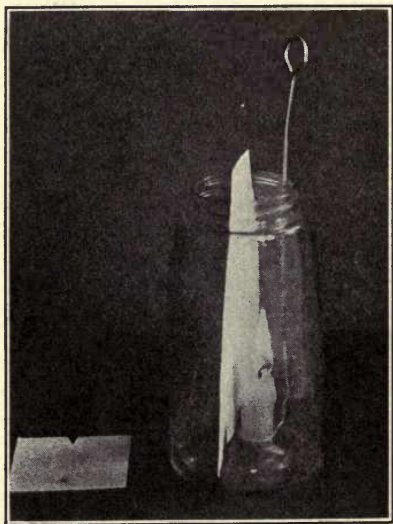
room in which so many died for want of air is known in history as "the black hole of Calcutta."

You might think that with so many people and animals breathing out this poisonous gas into the air, the supply of air would all be used up after a time. Nature has provided a wonderful arrangement to prevent this. By means of the trees and plants, the carbon dioxide is taken out of the air so that it is purified, and is made ready for us to breathe again. The gas which is harmful to us is a most necessary food for the plants. They take it through their leaves, much as we do through our lungs. They keep the carbon dioxide that we breathe out, and send the oxygen back into the air for our use.

The only way to obtain the fresh air needed when we live indoors, is to have some means provided by which the outdoor air may be brought in to us, and the air which has been used and has become impure within may be carried out. Changing the stale air indoors. Changing the air in this way is called *ventilation*. Every house, schoolhouse, church, store, or other building where people work or play or live ought to be well ventilated. Many people ventilate their houses by leaving the doors and windows open. This serves well in warm weather. In cold weather it is not a very good way, as it causes drafts and makes the floor so cold that it is hard to keep the feet warm. It is much better to have the air brought fresh from the outdoors, then warmed by a heater before it enters the rooms.

Air does not move of its own accord. There must be a wind, or something like a wind to force it in and out of rooms. To ventilate a room there must be both an *inlet*, a way for fresh air to get in, and an *outlet*, a route for the foul air to get out.

Try this experiment: Take a tall glass jar. Attach a small piece of candle to the end of a long wire, as shown in the picture. Light the candle, and lower



TRY THIS EXPERIMENT.

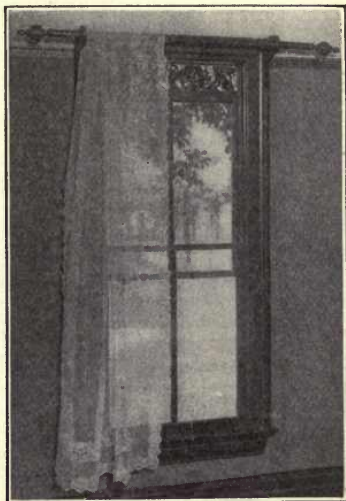
it into the jar. At first it burns brightly. By and by it grows dim and finally goes out, leaving just smoke. This happens, as we have learned, because the carbon dioxide which is made by the burning of the candle, and which is heavier than the air, settles in the bottom of the jar, and puts out the flame. Let us put in the jar a piece of pasteboard, notched at the bottom, thus dividing it into halves. Light the

candle and try again. Now the flame keeps bright and the candle continues to burn, because we have provided an inlet for fresh air and an outlet for foul air on the other side.

Don't you see that people shut up in a room without ventilation will be poisoned in time just as you saw the candle was? Their lives do not go out so quickly, but by degrees they will get sick and die, if they continue to live in unventilated rooms.

If there is no way of ventilating a room except by windows, two openings of some sort must be provided. The upper sash may be lowered two inches for the spoiled air to get out, then the space between the upper and lower sashes where they overlap gives a chance for the fresh air to come in; or we may have two windows on opposite sides of the room, each open a little way, one for the fresh air to come in, the other for the foul air to get out.

How far they should be open must depend upon how many people there are in the room; also how many pet animals there are, whether there are gas jets or lamps burning, how large the room is, and how much furniture it has in it. When a strong wind is blowing, and in very cold weather, small openings may be sufficient, while



IF YOU VENTILATE THROUGH A WINDOW, YOU MUST PUSH BACK THE CURTAINS SO THEY WILL NOT STOP THE AIR AS IT COMES IN OR LEAVES THE ROOM.

large ones are needed when the air is quiet. Each gas jet or lamp spoils as much air as a person.

There are several ways by which houses are ventilated, but the plan is the same for all, viz., an inlet for



IS THIS BOY LAZY, OR IS HE POISONED BY BAD AIR?

fresh air, and an outlet for foul air, with something to make a draft so the air will move. If the air enters directly from out-of-doors, the outlet must be near the top of the room, because the warm air rises, and the air already in the room is warm air that has become foul.

If the air is warmed by a furnace, or some similar means, before it enters the rooms, the outlet should be placed at the floor, because when the pure air enters the room warm, it first rises to the upper part of the room, and then as it cools, and at the same time becomes impure, it settles to the floor, where it should be taken out.

Air that has become foul through use has a musty odor, and when we first come in from outdoors we can smell it. After one has been in a badly ventilated room for a time, the nose gets used to the odor, and so he does not notice the bad air. It is a good thing to "follow our noses" when we detect the close, musty smell. If we mind this danger smell, and seek some way to change the air, we save ourselves much ill feeling and harm. When the air in a room gets musty, the people in it are likely to feel stupid or sick, or to get headaches.

REMEMBER: You cannot work or study well in bad air, and you cannot keep your good health unless you have a supply of fresh, unspoiled air all the time. Air that is not in motion — dead air — is especially harmful.

HEALTH PROBLEMS

1. If you live in the city, do you have a garbage man remove your garbage frequently? Does the city require the removal of the garbage? Why?
2. What is usually done with the garbage in a small village?
3. What arrangements should be made for garbage removal?
4. What decaying things about country homes spoil the air? How can this evil be remedied?

5. Name some disease that is caused by the microbes or germs carried about in dust or bad odors.

6. What places in cities have many bad odors? Are they places in which people have good health?

7. Why do you think we are so made that we dislike dust and bad smells?

8. How is your schoolroom ventilated? How much air comes in every minute? How can you find this out?

9. How is the used air taken out of your schoolroom?

10. How much fresh air is needed in your schoolroom every minute?

11. How are the living room and the dining room in your home ventilated?

REVIEW QUESTIONS

1. If we must stay indoors a good deal, what should we try to do about the air we breathe?

2. In what ways may air be spoiled for our use?

3. What is the chief reason why dust and bad odors are harmful to health?

4. What happens to the air which is breathed in by people around us?

5. What is meant by the *combustion* that goes on in our bodies all the time?

6. What is meant by *carbon dioxide* thrown out from the lungs in breathing?

7. How could you show that carbon dioxide is in the air we breathe out?

8. How can we keep a supply of fresh air if we live much indoors?

9. What is meant by *ventilating* a house?

10. What is the proper way to have good ventilation in a house?

11. Can you tell spoiled air by the sense of smell?

CHAPTER XI

HEALTH HABITS IN BREATHING

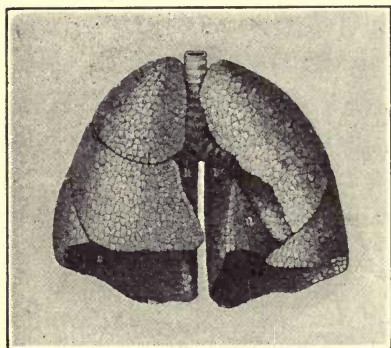
EVERYTHING that lives must breathe. Plants breathe by means of their leaves, fishes by means of their gills, while earthworms breathe through their skins. But man has special organs designed solely for breathing. Why must every living thing breathe?

One day last spring Bertha was walking with her father along a stream, where she could hear the croaking of the frogs. "Watch," said her father, Means of breathing. as a big one came to the top of the water, "and see how he drinks air. He swallows in a mouthful at a time, just as you drink water. That is the frog's way of breathing. If we could see the inside of his body, we should find there a queer-shaped bag with a tube running up to his throat. This is the frog's air bag, and when he comes to the surface he swallows enough air to fill it. Then he can dive down into the water or mud again, and stay under until his supply of air is used up."

Every person has two air bags in his body. Our air bags, the lungs. They are called *lungs*. Our lungs need to be emptied so often, however, that we could not live very long under water.

If you look on page 97, you will see that the ribs and backbone together form a case about a space within the body. This case is for the protection of the delicate organs which belong inside. The space within is divided into two parts or *cavities* by a very strong muscle, called the *diaphragm*. The upper cavity is the

chest, the lower is the *abdomen*. The lungs lie within the chest cavity. They appear somewhat like a sponge, being masses of tiny sacs filled with air.



THE LUNGS.

Air enters the body through the nostrils (openings of the nose) and passes to the lungs through a tube called

the *windpipe*, which begins at the back part or root of the tongue. The windpipe divides like a tree into two main branches, then into a great many smaller ones, some not larger than a sewing needle, each of which conveys a portion of the air to one of the little sacs that make up the lungs.

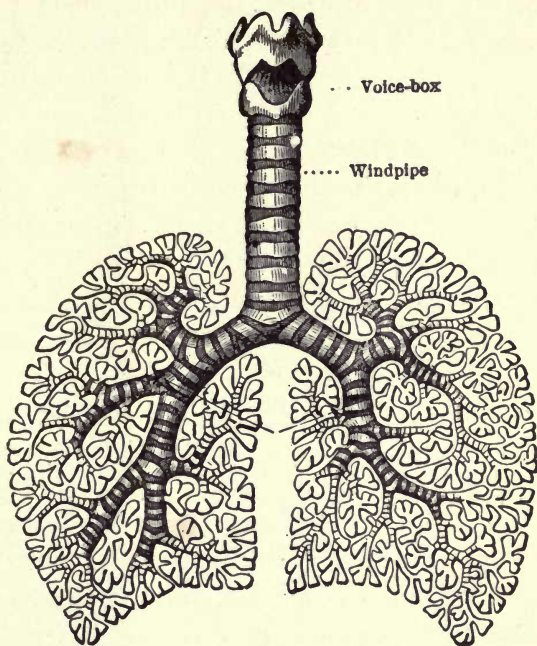
One can receive air into the body through the mouth, but it is not the right way nor the safe way. When air is breathed through the nose, it has to pass down behind the mouth through a moist, narrow canal. Here it becomes both

The right
way to
breathe.

damp and warm before passing on to the lungs. In the openings of the nose grow some stiff hairs that strain out much of the dust in the air we breathe. Finer dust and germs are caught and held by the moisture in the nose, as you can prove by blowing the nose after an hour's work in a dusty place. But when air is breathed through the mouth, it may reach the air passages and lungs cold, dry, and filled with dust; it may thus do much harm.

When going from a warm room into cold air, should one be careful to breathe through the nose? Why?

The reason why some children breathe through the mouth is because of growths which occur in the nose, which either close up the passages for air, or make them so narrow that sufficient air cannot pass through.



AIR TUBES AND AIR CELLS.

This trouble is a very common one. Unless an examination is made by a physician, one may go on for a long time before it is discovered. Quite recently it was found that in four hundred and fifteen New York State towns, one eighth of the children were "mouth breathers." The number in other places is no doubt as great.

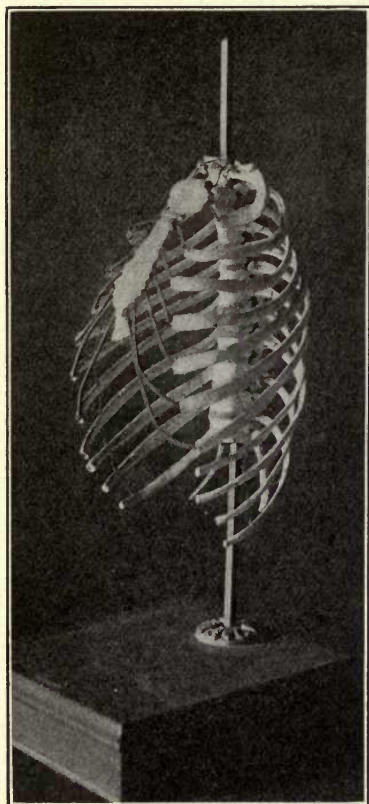
Some people who know it is harmful to make a practice of breathing through the mouth keep the jaws closed and breathe through the nose during the daytime, but at night when asleep they drop the jaw open and unconsciously breathe through the mouth. In the morning when they awaken, the mouth is dry, the breath has a bad odor, and the voice is often hoarse. Such persons are likely to suffer from headache and a "dull" feeling in the head.

If one keeps on breathing this way, the shape of his mouth and nose will be changed, and the expression of his face may be spoiled.

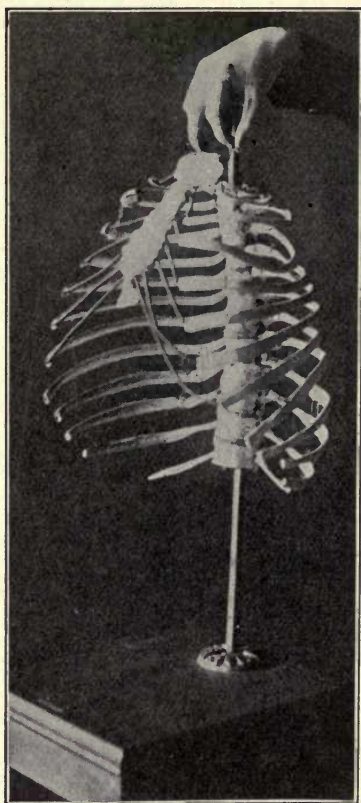
If you have constant difficulty in breathing through your nose, you should ask your parents to take you to a physician to find the cause, and to have your trouble remedied.

We require so much air all the time, and we need to have it changed so often in the lungs, that nature has made our breathing apparatus so that it works a good deal like a pair of bellows. But there is this difference: in the bellows the air enters by one opening and goes out through another, while the air enters and leaves the lungs by the same route.

The bellows action of the lungs is made possible by the *ribs* and *diaphragm*. The ribs are elastic, and the



POSITION OF THE RIBS WHEN ONE
BREATHES OUT.



POSITION OF THE RIBS WHEN ONE
BREATHES DEEPLY.

space between each two is filled with muscle. One kind of muscle draws the ribs apart, and another draws

them together again. The diaphragm, which is fastened along the lower border of the ribs, is shaped like a dome rising into the chest cavity. When the lungs work like a bellows. we start to take a deep breath, the muscles pull the ribs apart and at the same time the diaphragm flattens itself down. This causes the cavity of the chest to enlarge, and then air rushes in through the nose or mouth to fill up the space. When the muscles cease pulling, the ribs and diaphragm return to their former position, thus making the cavity of the chest small again, and forcing the air out through the nose or mouth.

This process is repeated every time one breathes. In health we breathe eighteen or twenty times a minute. Children breathe faster than adults. Why, do you think? We breathe faster when we run than when we walk. Why?

If very tight clothing is worn about the chest, the ribs cannot stretch apart as far as they should in breathing. The action of the diaphragm is also interfered with. And so not as much air can be taken into the lungs as should be. Cutting off the air supply in this way may result in harm to the body. So you see one should always wear his clothing loose enough to expand the chest fully with each breath. Why?

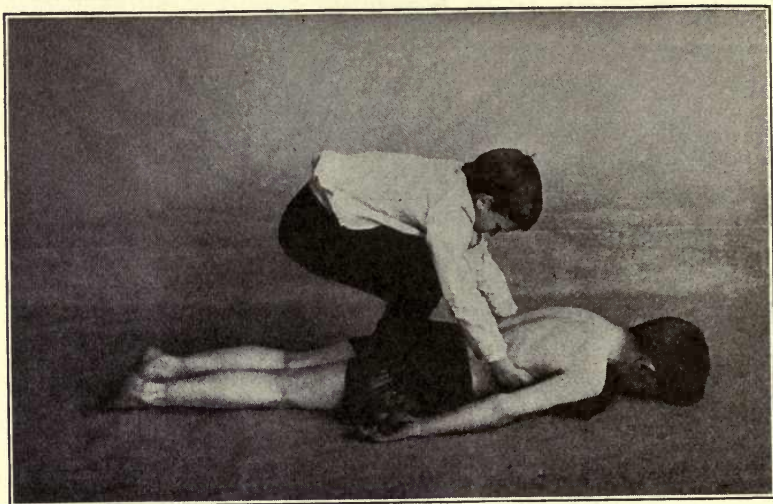
People who wear tight corsets or bands about their waists often deprive themselves in this manner of much of the air which they need. They are likely to get out of breath very quickly.

About two thirds of a pint of air is taken in by a grown person, and the same quantity forced out, each time he breathes. The lungs are large enough, however, to hold almost a gallon and a half of air. Nature has provided us with much more lung room than we ordinarily use in breathing, so that when we need to breathe much faster and fuller, as when we are climbing hills, running fast, playing ball, or otherwise exercising hard, we may have in stock enough air for the occasion.

If any one wants to have strong lungs, he must exercise them. The best way to do this is to take full,



BREATHING EXERCISE



HOW TO SECURE ARTIFICIAL BREATHING.

deep breaths all the time when at work or at play. We should get into the habit of keeping in a good poise, because a bent and cramped position will prevent proper breathing. It is a good plan now and then to stop what we may be doing, and take the following exercise: Place the hands on the hips as the boy on page 99 is doing. Then bend the head backward, lift the chest as high as possible, and take in long, deep breaths of air, then force the air out slowly while bringing the head up again. If you feel cold at any time, several deep breaths in this way will help to warm you.

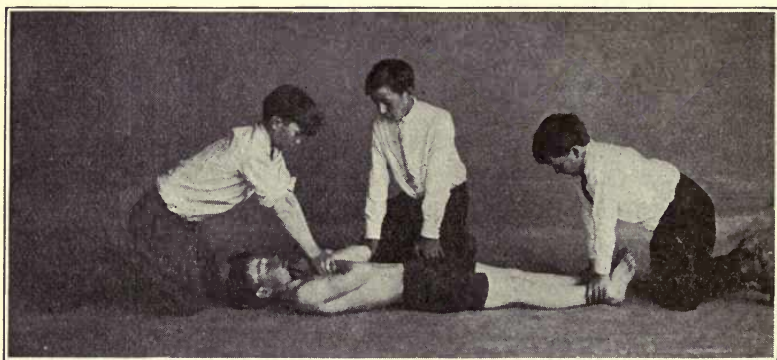
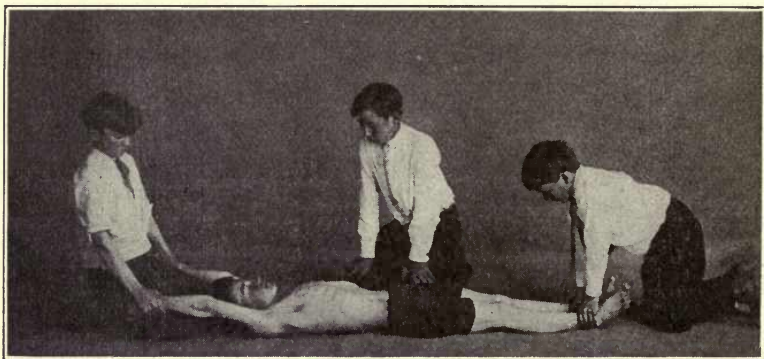
Exercise
makes
strong
lungs.

Sometimes, when people are long under water, or are struck by lightning, they may temporarily cease to breathe. If they are still alive, they may sometimes be made to breathe again by means of *artificial respiration*. This is one way it may be done: Turn the person face downward upon the ground or floor. Place a hard roll of something—a large folded coat will do—under his chest as shown in the picture. Then standing astride of him with your face toward his head, place your hands one on either side over his lowest ribs. Bend your body slowly forward, then backward, pressing upon his ribs, and slightly lift him as you do so. Make the movement a dozen times a minute. This should be continued until he breathes, which may sometimes require a half hour's work.

First aid,
artificial
breathing.

Here is a simple method of employing artificial respi-

ration, which should be practiced until well understood: Have a person lie down upon a bench or a raised platform, with the face upward, and the head hanging over



HOW TO SECURE ARTIFICIAL BREATHING.

one end. The operator, standing above the person's head, should take hold of both arms below the elbows, and draw them steadily upward above the head, retain-

ing them in position two or three seconds ; then allow them to go back to position, and press the elbows firmly against the sides of the chest. Drawing the arms upward will cause the air to rush into the lungs, and returning them to position and pressing against the chest forces the air out of the lungs. By repeating this simple operation twelve to sixteen times a minute, actual breathing may be very perfectly imitated.

Another very simple method of artificial respiration is this: Place

the unconscious person upon the back. Kneeling beside him, place one hand beneath the shoulder on the same side, the other hand just under the back lower down. Roll the patient over toward the opposite side until he is turned a little more than half way upon the face. Press upon the shoulder and side of the chest in such a way as to compress it. Then roll the body back to the first position. It is a good plan to place a support of some sort between the shoulders. The patient's coat may be rolled up for this purpose.

Best of all is a pulmotor or lung motor by which the lungs may be filled and emptied with regularity as in



THE PULMOTOR.

life. Many lives have been saved by the prompt use of these means.

REMEMBER : Any one who wishes to have good health must get in the habit of breathing through the nose always ; he must wear his clothing so loose that he can fill his lungs full of air at every breath, and he must get into the habit of breathing deep and full, no matter what he is doing.

HEALTH PROBLEMS

1. Show the class how it is that the lungs work somewhat like a sponge.

2. Describe the movements of the ribs and chest when one breathes.

3. Do you know any people who have the habit of breathing through the mouth ? Why do they do so ?

4. How can any one form the habit of breathing through the nose, during sleep as well as during waking hours ?

5. Try this experiment : Tie a scarf or rope tightly about the chest. Then see if you can run as fast or as far as you can ordinarily. Explain.

6. Walking at ordinary speed, count the number of steps you take, while you draw as deep a breath as possible. Compare what you can do with what other members of the class can do.

REVIEW QUESTIONS

1. By means of what organs do human beings breathe ?

2. Where is the *chest* ?

3. How is the chest cavity formed ?

4. Why are the lungs said to be like a sponge in their action ?

5. How does air enter the body ?

6. Why should one avoid the habit of breathing through the mouth ?

7. What will happen to the shape of the mouth and chest if one breathes all the time through the mouth ?

8. Why are the lungs said to work like a pair of bellows ?

9. Why should one not wear tight clothing about the chest or over the diaphragm ?

10. How much air is taken in at every breath ? How much can the lungs hold when they are taxed to their limit ?

11. What is the best way to exercise the lungs ?

CHAPTER XII

HEALTH HABITS IN SLEEPING

You know that sleep is necessary for good health. Children and grown people who fail to get enough sound sleep soon feel ill-humored and sick.

While awake, we are active most of the time. All parts of the body are busy at work. Of course, this results in much wear and loss which has to be made up somehow. Whether we are awake or asleep, the body is all the time repairing itself; but while we are active, so much body material is worn out that the mending gets far behind. So there must be regular times when the body is quiet and in repose with all its machinery running at very low speed, if it is to catch up with its work of repair.

In the springtime when the sweet peas are beginning to grow in the flower garden, if you will measure a plant early in the morning, and again at dusk, and then again the next morning, you will find that the plant grew a good deal more during the nighttime than it did during the daylight. This is true of other plants. During the daytime the plant is busy storing up food from various sources. During the night it uses this material to increase its growth.

This is so with animals. Children grow during sleep more than they do when awake. Sleep is thus the best time for both growth and repair of the body.

Healthy sleep is sound and dreamless. After a night of such sleep, one awakes feeling fresh, rested, and brim full of good spirits. He is ready then to take hold of any task. Even the things that looked hard the night before seem easier after a good night's rest. Give instances in your own life to illustrate this.

The best time for sleep is during the darkness of the night. You have heard it said, perhaps, that sleep gained in the early hours before midnight refreshes one more than sleep after midnight. Why should this be so?

The old maxim "early to bed and early to rise" indicates an important health habit. Going to bed late and getting up late is by no means so good a habit. Every one must have a certain amount of sleep. The sleep we need depends upon our age and health. The younger one is, the more sleep he requires. Persons in ill health need more sleep than those who are well. The following program for people of different ages is a good one:—

From four to seven years of age, twelve hours of sleep at night.

From seven to nine years, eleven hours of sleep.

From nine to twelve years, ten hours.

From twelve to sixteen years, at least nine hours.

Most grown people require from seven to eight hours of sleep.

To go to bed at a regular time each night is a most important health habit. If one gets into the custom

Regular habits in sleep. of going to bed one night at one hour and another night at another hour, he will soon find it difficult to drop off to sleep at once.

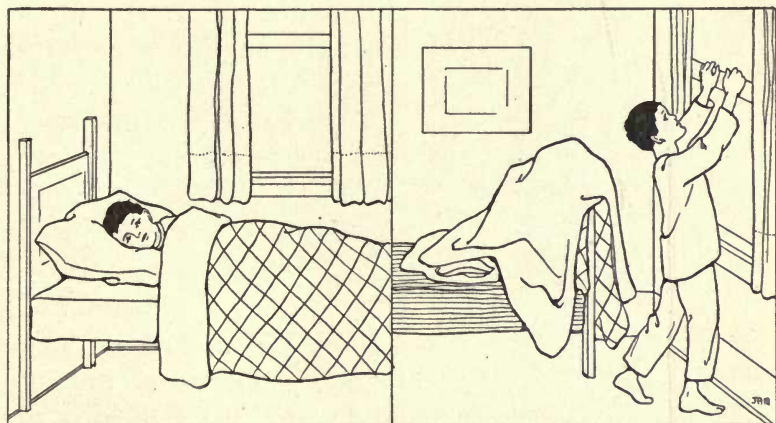
If one keeps up such an irregular plan, he is likely to lose much needed sleep, and illness may result. One cannot keep in health without his full requirement of sleep. What is the number of hours which you need to sleep to feel and keep well? At what hour ought you to go to bed to get your full sleep and arise in season to be ready on time for school?

In the morning, when sleep is ended, we should arise promptly. To lie in bed and doze, half asleep, is a bad habit in which we ought not to indulge.

Most people sleep soundly when they are somewhat tired. Why is this? A very wise man once said: "The sleep of the laboring man is sweet." Have you observed that those who are active during the day sleep better at night than those who lounge about, and spend the daytime in idleness? Why should work and exercise lead to sound sleep? It is not best, however, to play very hard or to engage in exciting games just at bedtime, as this is likely to arouse one so that it will not be easy to get to sleep. The same is true of reading or listening to exciting tales near bedtime.

Perhaps you have noticed that people who eat hearty

suppers late at night are likely to sleep poorly, and to have bad dreams. Those who use tea, coffee, or cocoa at supper are liable to wakefulness at night, for these drinks arouse one, or make him sleepless. Many people are wakeful if they drink coffee, tea, or cocoa any time during the day.



IF YOU CANNOT SLEEP IN THE OPEN AIR, BE SURE TO LET THE FRESH AIR INTO YOUR SLEEPING ROOM.

One sleeps best when breathing pure, fresh air. To sleep in the open air is most restful. If one cannot sleep out-of-doors, he at least should get plenty of outdoor air into his sleeping room at all seasons. **Fresh air.** About one third of our whole life is spent in sleep. Not to have good air to breathe during so much of life may shorten it considerably. Besides, for the body to do its work of repair during sleep in a perfect manner, it needs the help of pure air. If one sleeps in

a close, warm room, the body will be unable to obtain this help, and so its work cannot be well done, and one may awake in the morning feeling dull, tired, and cross, and perhaps with a headache. You will remember

that in a previous chapter we saw how one can get an abundance of fresh air at night. You should try this plan if it is possible.

To secure ease during sleep, it is the practice in this country to lie upon a bed of some kind. Many people think a soft bed is best, while others say a hard bed makes one sleep better. The custom in many lands is to sleep upon a rug placed on the ground or on the floor.

The bed of the little Chinese boy or girl is often made of two narrow benches, across which are placed about seven

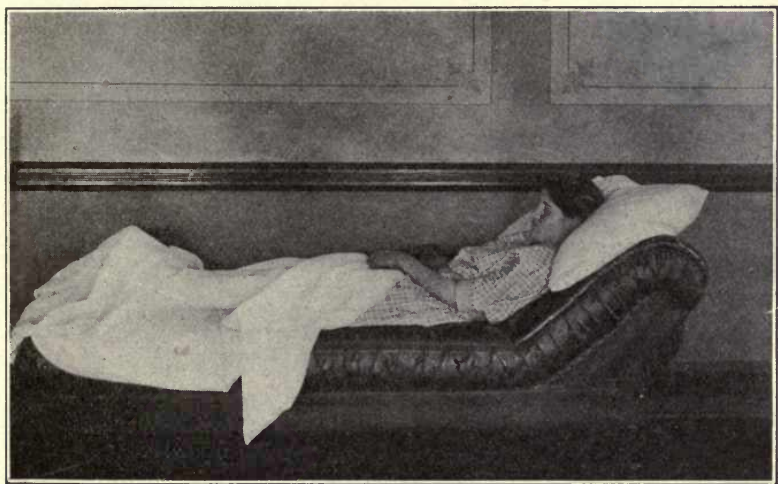
boards covered with a piece of matting. That is all. Two hard queer-looking things, which you might think were stools but would never guess were pillows, lie on the bed.

Many children in Mexico sleep in quite a similar



READY FOR A SOUND SLEEP IN THE
COLD AIR.

bed. They use a blanket to cover the boards. A little Mexican girl who was staying at the home of an American lady was so used to a hard bed that when the lady put her on a soft couch for the night she could not sleep at all; she was able to do so only by getting off the bed, and lying on the hard tile floor.



WHAT WILL HAPPEN TO THIS GIRL IF SHE CONTINUES TO LIE IN THIS POSITION?

Many people think a pillow is not needed. If one be used, it should be firm and not large; just high enough to bring the head on a level with the body. It should never be high enough to elevate the shoulders. The real use of a pillow is to support the head. The Japanese maiden who sleeps on a notched block of wood with a tiny

The question of the pillow.

cushion placed under the neck has a better support than the big, fluffy cushions we use for pillows. The use of pillows while sleeping is a common cause of round shoulders. You will remember that while young the bones easily become crooked. To lie every night with



DO YOU APPROVE OF THIS POSITION? WHY?

the head too high cramps the chest, and after a little changes the shape of the shoulders.

The most restful and healthful way to lie for sleep
For health- is with the body stretched out at full length,
ful sleep. so the spine is straight.

The body must always be comfortably warm while asleep. One cannot sleep well if cold. Even if the feet on going to bed are cold, this will keep one awake.

If at bedtime one's feet are cold, he should warm them well. A good way is to put the feet in hot water for five minutes, then dash a dipperful of cold water over them, and wipe them dry by rubbing them hard with a rough towel.

The best thing to cover oneself with while asleep is soft, fleecy blankets, warm, but of light weight. All



BIG FLUFFY PILLOWS.

bed clothing, like all body clothing, should be porous; that is, it should allow air to pass through it.

While we sleep, as when we are awake, waste and perspiration are being thrown off by the skin. If the air cannot get through to cleanse them, the bed clothing will soon be filled with this waste. Under such coverings, sleep is likely to be restless.

Comforts and quilts filled with cotton make warm coverings, but they are not so healthful as blankets. Can you think why?

Clean beds are necessary for health. My neighbor Janie has been told this so often that she has formed an excellent health habit. Every morning when she is



A CLEAN, CHEERY, AIRY SLEEPING ROOM.

dressed she places two chairs at the foot of her bed. Then she takes off the covers one by one and throws them loosely over the chairs. She begins with the top one, and always takes pains that none of them rest on the floor to get soiled. Then she places the pillows on another chair. This done, she opens wide her windows, shuts the door, and leaves the bedding for

the fresh air to cleanse while she goes to breakfast. Each week, on the day when the bed linen is changed, she carries her blankets out-of-doors and hangs them on the clothes line in the bright sunlight for a few hours to make them fresh and sweet. I need hardly tell you that Janie sleeps more soundly because of the good care she gives to her bed.

HEALTH PROBLEMS

1. Measure exactly your height just before you go to bed any night. Then measure it again in the morning just after arising. Do you find the heights are the same?

2. Why should one feel rested after a night of sound sleep? What has taken place in the body during sleep?

3. Do you ever lie awake in your bed at night wishing you could get to sleep? If you do, think over what you did for several hours before bedtime, and see if you can find the cause of your sleeplessness. Did you drink tea, coffee, or cocoa?

4. Why do people who live in the city like to go out in the country, and sleep in a tent or under the open sky?

5. Can one sleep as soundly when lying on the back as when lying on the right side?

6. Can one sleep soundly with knees drawn up toward the chest, and with one hand under the head?

REVIEW QUESTIONS

1. Why is sound sleep necessary for good health?

2. When does the repair of the body go on most actively?

3. When is the best time for sleep?

4. How much sleep should people have at various ages?

5. Does a person need more sleep when he is ill than when he is well? Why?

6. Should one go to bed at regular hours every night ? Why ?
7. What habits may make one sleepless ?
8. Should one have fresh air while sleeping ? Why ?
9. How should one lie while sleeping ?
10. How should one's bed be arranged for the most healthful sleep ?
11. How should the bed be cared for in the morning ?

CHAPTER XIII

HEALTH HABITS IN EATING

WOOD, glass, steel, and other materials are needed to build a house or a ship. So certain materials are needed with which to build our bodies. This **Building material,** building material we obtain chiefly from our food. Our bodies are made up of what we eat. If one eats poor food, he will not grow properly, and he may become ill, or feel half sick all the time. Wrong habits of eating are the cause of more sickness than any other one thing. To keep well, and to accomplish the most, we must choose good foods and eat them properly.

Our bodies are in some respects like machines. For one thing, they are always wearing out, and needing to be repaired. So material is required for **The body resembles an engine.** repairs in the body, as well as for building. How does a locomotive obtain the energy which enables it to pull a train? How does the body get the energy which it needs for work and play? If you put your hand into cold water it will soon become cold, but when it is removed it quickly becomes warm again. This is because the food we eat is somehow burned in the body, and in this way the body is kept warm.

Food supplies three essential body needs:—

1. *Building material.*
2. *Energy or power for play or work.*
3. *Heat to warm the body.*

All good foods supply each of these three things. Very few foods contain just the right amount of each kind of food material. Some foods, such as eggs and meat, contain more building material than the body needs, while others, as butter and sugar, are composed wholly of energy and heat-making material. So we need to eat a variety of articles, such as bread, butter, milk, eggs, vegetables, and fruits, in order that the body workers may be able to get hold of plenty of each kind of material needed. Some articles of food, as whole-wheat bread, will by themselves supply the body's needs for a time.

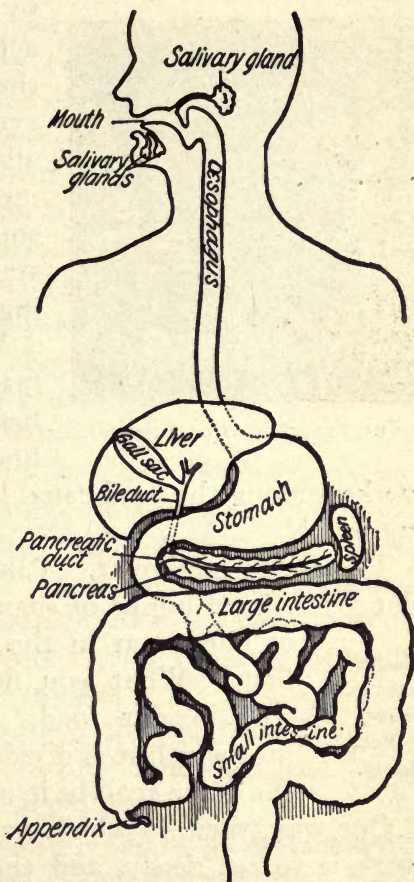
Children need more food in proportion to their size than do grown people, because they are building their bodies. They need material for making bones and muscles, and all the other growing organs. But children very often overeat.

In manufacturing food into muscles, bone, and so on, we ourselves can do but little. We can put it into our mouths, grind it with our teeth, and swallow it. The body must do all the rest. But we can help or hinder the work in many ways.

One way in which people often hinder the body's work is by *eating too fast*. Food as it is put into the

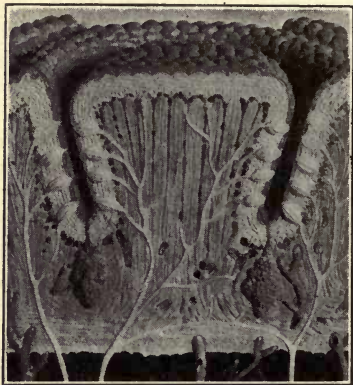
mouth is not in condition to be used by the body. It has all to be dissolved, and made into a liquid form before it can be used in the body. The process by which this is done is called *digestion*. The work of digestion.

The organ in which this work is carried on is a long tube, or *canal* as it is called, beginning with the mouth. If laid out straight and measured, this canal would be about thirty feet long. In some parts it is narrow, while in other places it is much wider. One portion of it, the *stomach*, is large enough to serve as a sort of storehouse for the food eaten, until it can be worked over by the body. Some parts of the tube are straight, other parts are coiled. At different points along the canal are workers that do some special thing to the food till all material that is good for



THE FOOD CANAL.

the body's use has been culled out, and sent into the blood. There is such unity between these workers that when one begins to act all the others are called into action. The taste of food in the mouth is a signal



THE "TASTE BUDS" (magnified).

to the workers of the stomach to be ready. In turn the word is passed along to every working station until all the workers are in readiness for service. Even so small a thing as a wafer starts the entire force working.

When a person eats very fast, the food is swallowed before it can be crushed into fine pieces, and then the workers along the food canal have a hard time dissolving it.

Try this experiment. Take two glasses of water. Put a few hard lumps of sugar in one, and a spoonful of fine sugar in the other. Which dissolves first? What you find true of the sugar is true of our food. The finer the particles into which it is divided before it is swallowed, the more readily it is digested.

One way, then, in which we can help the body in its work is to *eat slowly*, and chew every morsel of food until it is fine like cream before it is swallowed.

Health
rules in
eating.
1. Eat
slowly.

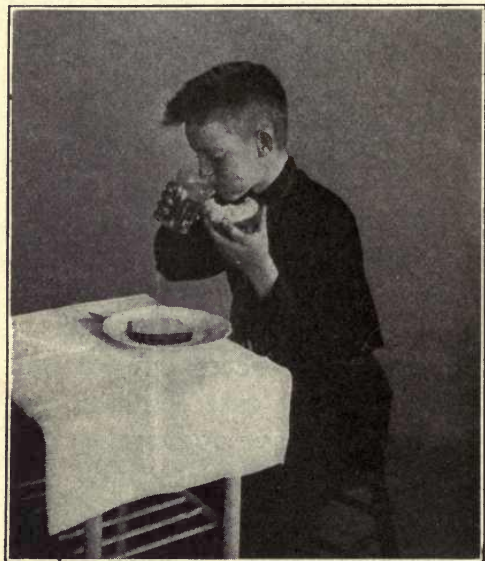
Some experiments which have been made have proven that two thirds of a pound of food *well* chewed supplies the body with just as good material to use as does a whole pound of the same food when chewed too rapidly.

Did you ever look at your tongue in a mirror? If so, you must have noticed that its surface is covered over with little points, some of them larger than others. These points are sometimes called "taste buds" because it is by means of them that we are able to taste the different flavors in food and in other things we put into our mouths. One curious thing about these taste buds is that the points which give the best taste for sweet things are on the tip of the tongue. We taste some things best on the side of the tongue, while we taste bitter things on the back of the tongue. If our tongues are coated and furred, the taste buds do not work well, and our food seems to have no taste, so that we do not care about eating. These taste buds were meant to give us enjoyment while we eat. But if we hurry through our meals, swallowing our food almost as soon as we get it in our mouths, we miss most of the taste, and spoil Nature's plan for our pleasure, beside doing ourselves an injury.

When people eat fast they are very likely to *eat too much*. The workers in the long food canal are able to do only a certain amount of work. When too much food is eaten, not any of it can be as well digested as it ought to be. If food is not well digested, then, of course, it does not make good material for building

or warming the body, or keeping it fit for play or work.

Do you think one should ever eat until he feels *stuffed*? How much one ought to eat depends upon his size, his age, the work he does, the weather, whether he lives indoors or outdoors, whether he is active or idle, and so on.



GULPING DOWN HIS FOOD. WHAT DOES HE
MISS IN DOING THIS?

Three meals each day are quite

2. Eat enough for regularly. boys and girls who are in health. These meals ought to be eaten *regularly*; that is, at the same hour every day. If we eat our break-

fast every morning at seven o'clock, and our dinner each day at one o'clock, the body is on the lookout for the food at those hours, and has everything all ready in the stomach to receive it and make use of it. If, however, one gets so interested in his play that he comes to dinner an hour or two later than usual, then when he swallows his food the stomach is taken by surprise.

If one is careless and eats his meals at different hours each day, he will be likely to upset Nature's orderly plan, and illness may follow.

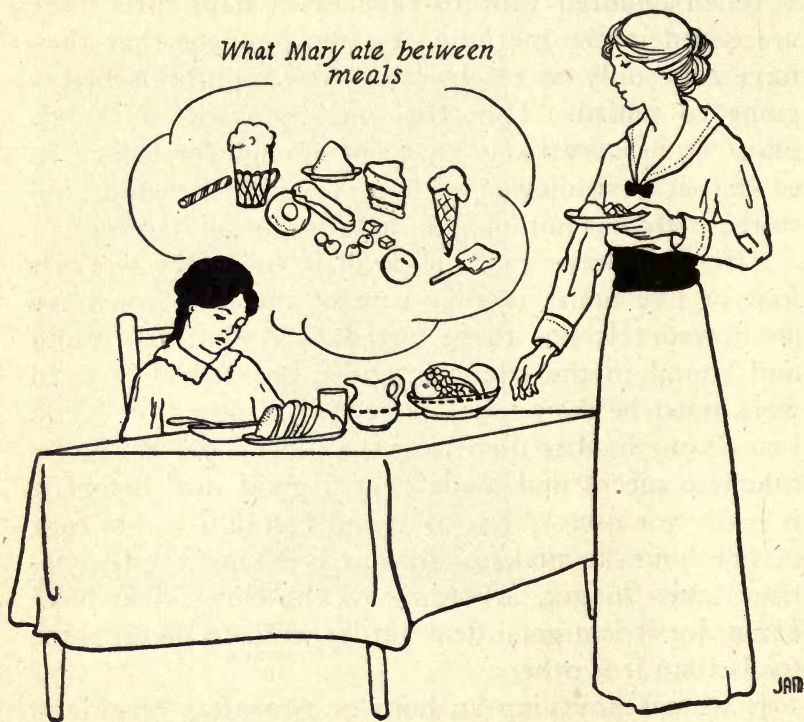
When children wait to take extra naps after they are called in the morning, it often happens that they have time only to eat hastily a few mouthfuls before going to school. This, too, interferes with Nature's plan. It is very likely that not enough food is eaten or that it is swallowed without being well tasted, and so the body has not enough material for all its needs.

After you have eaten a meal, it takes the workers four or five hours to take care of the food you have swallowed. It has to be sorted over, churned 'round and 'round in the stomach, and a great deal of hard work must be done to it before it is disposed of. You know your food is used to make blood, and has to be taken to pieces and made over a great deal before it is ready for use. Now, as I said before, it takes four or five hours to make over your breakfast, and sometimes even longer, according to the things you have eaten, for it is a good deal harder work to digest some foods than it is others.

If we eat anything an hour or two after breakfast, when the work of making over the food is well under way, the workers, instead of being able to keep right on and finish their work, have to begin again at the very beginning of the process of digesting the new food that has been eaten. So it may happen that the breakfast material is kept

3. Give the digestive organs rest.

much longer in the stomach than it should be, and too much acid is developed, causing sour stomach. The food workers, too, are obliged to work a great deal



SO SHE HAS NO APPETITE, AND "DOES NOT FEEL VERY WELL."

more and a great deal longer than they ought to, and if we keep on eating between meals, they will get no rest, and by and by they will get so tired that they will not do good work at all, and the boy or girl who has kept them so busy will become sick.

If you have eaten too little food at a meal, and feel hungry before the next meal, you may eat an apple or orange or some other simple fruit; but cookies, candy, bread and butter, and similar foods should be avoided. Fruits, if ripe and if well chewed, give the stomach very little work to do, as they are already cooked and digested in the sun, and contain food-stuffs ready for the body to use; so they do not tax the digestive organs heavily.

When the stomach is abused, it becomes unable to digest, and then we *lose our appetite*. Pain in the stomach, vomiting, and sick headache are some of the ways in which the stomach complains when it has been abused. We never feel the working of a healthy stomach.

The food workers, besides needing rest after their work on each meal has been done, need also to sleep at night with the rest of the body. Hence ^{4. Also} we should avoid eating food late at night. ^{sleep.} If one goes to bed with a stomach full of food, the workers will be very slow at their job, just as people work very slowly when they are sleepy. Getting the food out of the way at such a time makes so much extra trouble for the workers that our sleep is likely to be much disturbed, and we may awake in the morning without feeling refreshed by it. Moreover, we may have bad dreams.

Again, the food workers cannot serve well when the body is very tired. When we have been exercising

very hard at work or play, we should rest for a little

while before eating. Why is this a good health habit ?

5. Rest before eating.

It is best to avoid eating too many different kinds of food at one meal. The workers can take

care of five or six different foods easier than mixtures. they can a dozen kinds. We need to eat

6. Avoid mixtures.

a wide variety of foods, but it is better to have this variety from day to day than to have it all at one meal.

A wise man once said, "We should eat to live, not live to eat." Do you think that every one should

learn to choose foods that nourish the body, rather than such as merely please the taste ?

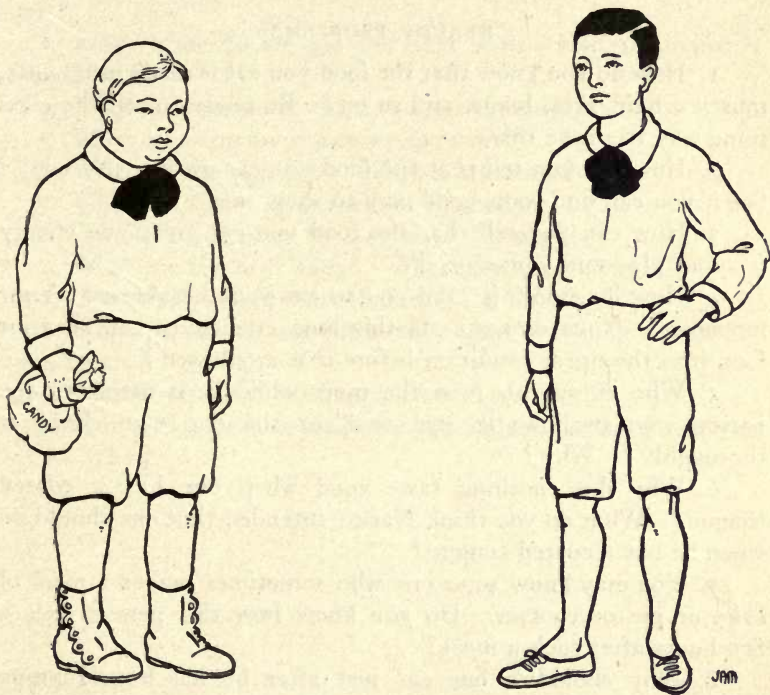
7. Eat nourishing food.

Why ? Sometimes children do themselves much harm by eating only the pie or pudding, pickles, and other relishes on the table, leaving the bread and butter, potato, and other important foods untouched.

Some parts of the food we eat cannot be used by the body. These portions are indigestible. After the workers have sorted out and taken care of all that is usable, the waste that remains must be expelled from the body. If this is not promptly done, it acts like a poison to the body, and may be the cause of serious illness. The "call of Nature" to relieve the bowels should always receive prompt attention at a regular hour each day. This is a health habit of the utmost importance.

REMEMBER : Any one who wants to get the most out of life must eat slowly and chew his food thoroughly,

so that he will get all the taste out of it, and prepare it as well as possible for the workers in the food canal. He must give the food workers time to rest. He



IF THESE BOYS SHOULD HAVE A CONTEST IN RACING, WRESTLING, OR BOXING, WHICH WOULD WIN? WHY?

must not eat between meals, not even candy. He must be regular at meals. He must not make a meal of cake or pie alone, just because he *likes* it. He must not eat until he feels stuffed. He must not eat when

he is tired. He must not wash his food down with drink. He must at a regular hour every day expel the useless material from the body.

HEALTH PROBLEMS

1. How do you know that the food you eat is made into bones, muscles, hair, skin, lungs, and so on? Be ready to tell the class some way to prove this.

2. How can you tell that the food you eat *warms* your body? See if you can find some good way to show this.

3. How can you tell that the food you eat gives you energy for your play and your work?

4. How long does it take you to eat your breakfast? Your luncheon? Your dinner? Is this long enough to get all your food into the finest condition before it is swallowed?

5. Who enjoys his food the more while he is eating it, the person who swallows it unchewed, or the one who chews it thoroughly? Why?

6. Why does nothing taste good when one has a coated tongue? What do you think Nature intended that one should do when he has a coated tongue?

7. You may know some one who sometimes makes a meal of cake or pie or cookies. Do you know how this person feels a few hours after such a meal?

8. Why shouldn't one eat just after he has been running hard?

9. After a meal at bedtime, have you ever had bad dreams? Why, do you think?

10. Will it be better for one's body if he talks about pleasant things at the table, than if he talks about disagreeable things, or if he gets angry? Why?

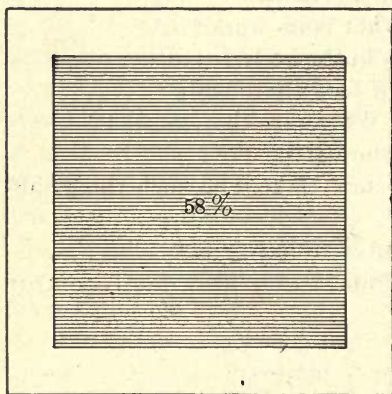
REVIEW QUESTIONS

1. From what do we obtain the materials with which to build and repair the body?
2. From what do we get the energy we need in play and in work?
3. From what do we get the heat with which the body is warmed?
4. Why do we need to eat a variety of foods?
5. What is meant by the term *digestion*?
6. Where is the *stomach*? What is its work?
7. What are the food workers in the body?
8. Why is it necessary to chew food thoroughly?
9. What are the *taste buds*? Where are they located?
10. How often should one eat during the day?
11. Why should one not eat candy, cake, and such things between meals?
12. Why do the food workers need to have rest?
13. Is it well to eat heartily immediately after hard work or play? Why?

CHAPTER XIV

HEALTH HABITS IN DRINKING

If you wet your handkerchief in water and lay it aside in the open air, you will find that after a time it has become dry. Why?



MORE THAN ONE HALF THE BODY IS WATER. THE SHADED PART OF THE PICTURE SHOWS THIS.

When you sit for a time in a close, hot room, your lips become parched, and your skin feels dry. The heat has made the air thirsty, and the air is trying to get moisture from your body.

Although the body is more than half water, it

is all the time losing moisture so rapidly that one needs to drink often to make good its losses. The

The body's need for water. body needs water also to supply the fluids which dissolve and change, or digest, the food we eat. Some of the fluids of the body help

to carry the digested food where it is needed. Another need for water is to break up and wash out of the body

through the sweat and in other ways the waste products that are continually forming. These waste matters are poisonous; if they are not expelled from the body promptly, illness will result.

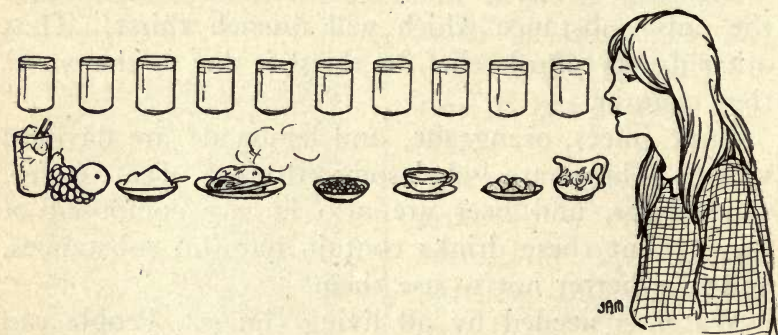
The body shows its need for drink by the "dry" or thirsty feeling, just as it shows when it needs food by the feeling of hunger.

The best drink is pure water. Water is, in fact, the only substance which will quench thirst. That other drinks afford relief for thirst is due to the water they contain.

Fruit juices, orangeade, and lemonade are flavored water. These are wholesome drinks. Tea, coffee, wine, cider, and beer are also largely composed of water; but these drinks contain harmful substances, and it is better not to use them.

Water is needed by all living things. People can live much longer without food than without water. To meet such a need, nature provides a bountiful supply of pure, fresh water in springs, and in rain and snow. Often, but not always, pure water is found in lakes, rivers, and brooks. In addition, there are underground streams which may be reached by digging or boring wells, from which we may draw as much as we wish. Pure water in this country is abundant and easily obtainable. In some countries, as in Mexico and Egypt, pure water is scarce, and is delivered from door to door on curious-looking wheel barrows, or in cans or skin bottles carried on the back of a man.

Most people do not drink enough water. It is rare that one drinks too much water. Many people drink a good deal of such drinks as tea and coffee, but not enough of pure water. Tea and coffee both contain in small quantities a substance known as an *alkaloid* which when used in pure form is so strong that it takes but a very small amount to kill a rabbit.



WE NEED ABOUT TEN GLASSFULS OF WATER EVERY DAY, BUT WE GET MUCH OF THIS IN OUR FOOD.

The person who has the habit of drinking strong tea or coffee is often greatly harmed by these. So the regular use of tea or coffee is a habit we should avoid if we wish to have good health.

A grown person needs from four to five pints (8 to 10 glassfuls) of water every day. A half-grown boy or girl needs about the same amount. Just how much of this he must drink depends upon the kind of food he eats.

Much pure water is stored away in fruits and green

foods; and those who make free use of these get in this way a large part of the water their bodies need.

People who eat a great deal of meat and almost no fruit need to drink much more water. Why, do you think?

While we should drink freely of water, it is best to form a habit of taking small quantities often, ^{Good} rather than a large quantity at one time. ^{habits in} Usually a person should not drink more than ^{drinking.} one glassful at a time.

If the water is very cold, it should be taken in small sips. Hold each sip in the mouth until it is warmed before swallowing. This should be done with any very cold drink or food. Why?

When water is taken during a meal, it should be only after the food in the mouth has been swallowed. If food is half chewed and washed down with drinks of any sort, it will not have so good a chance of being digested as when it is thoroughly chewed and moistened by the juices in the mouth.

We should drink only *pure* water. Because water is cool, clear, and sparkling is not a sure sign that it is pure. We must know its source in order to determine whether it is safe to drink. A pleasant taste and appearance are not sufficient. Why can we not always detect impure water by its taste or its appearance?

Water which comes from near the top of the ground is generally impure, because it contains impure sub-

stances that soak into it from the soil. Filth is often emptied upon the ground, or buried just below the surface. When the rains come, they wash much of this through the soil into the underground sources of water. Dug wells usually furnish water of this sort. Such water is likely to cause, in those who drink it, typhoid fever or some other serious disease.

When we are not sure that the water is pure, we may make it safe by boiling it for fifteen or twenty minutes. Boiling will give the water a "flat" taste, but its original flavor may be restored by pouring it many times from one vessel into another, so as to expose it to the air. It is always wise when there is any doubt about the purity of water to boil it, and then to store it in corked bottles or fruit jars in the ice chest.

Deep artesian wells usually furnish pure water. Rain water as it falls from the clouds is pure. If we could have a clean tank above the ground in which to catch the rain as it falls, we could keep it pure. But if it falls first upon a dirty roof, or through the dusty leaves of trees, it may be soiled by soot and dust which it collects from the air.

Ice which is cut from lakes or rivers is generally not safe. Unless ice is known to be from a pure source it should never be put into water or other drinks to cool them. If we need to make water cold, it can be done best by placing the pitcher containing it on ice, and by packing ice around it.

If we think a water supply is not good, we should have it tested by an expert. But we can first try the following test: Fill a two-ounce bottle nearly full of the water. Add a small lump of pure white sugar. Cork the bottle and leave it in a warm place. If the contents become clouded within a few days, it is of very doubtful quality. Why, do you think?

The danger from the use of impure water is sometimes made an excuse for using wine, beer, and similar drinks. While these are part water, yet such drinks cannot take the place of pure water for the body. These drinks all contain *alcohol*, a substance which robs the body of water. Their use does not quench the body's thirst. Instead, they are liable to create thirst.

Wine is made from the juice of grapes. When the juices of most fruits are fresh, they make good drinks. While the juice remains in the fruit it keeps fresh for a long time, because the skin protects it. When the skin is broken, and the juice is pressed out and left open to the air, it soon begins to change. This is the work of tiny plants, called *yeast* plants. These drop into the juice from the air, in which they are always floating, seeking for a soil to grow in. There is fruit sugar in the juice, and these tiny plants are quite fond of sugar. It makes them grow very fast.

Wherever the yeast plants are feeding and growing, two kinds of wastes are thrown off. One is a gas, the same gas we ourselves breathe out, *carbon dioxide*.

This forms in froth or bubbles on the top of the fruit juice, and finally passes off into the air. The other waste is alcohol. This remains in the liquid, giving it a peculiar taste. The change which the yeast plants bring about is called *fermentation*.

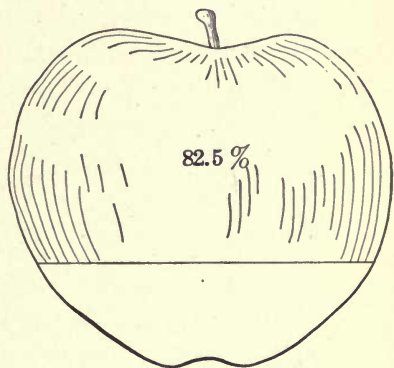
Pure alcohol is a deadly poison to everything which has life. If you should pour alcohol upon a plant, it would soon die. Put any living creature in alcohol, and it will die almost instantly. A man who did not think alcohol was harmful once gave some to his pet dog with its food; very soon after, the dog died.

If one should take pure alcohol into his mouth, it would raise a blister. Any drink which contains alcohol is hurtful to the body, and we should avoid its use. People seldom take enough alcohol to kill them outright; but whatever amount they take is likely to hurt them little by little. Hard cider, beer, ale, porter, wine, whisky, brandy, and rum all are alcoholic drinks. Many patent medicines and all "bitters" contain alcohol, and ought to be avoided.

Sometimes people steep herbs, barks, and roots in water, add sugar and yeast, and brew a "home-made beer." This too, when it is fermented, contains alcohol. Some fermented drinks contain much more alcohol than do others. Whisky, brandy, and rum are "stronger" drinks than beer, wine, and cider. Why?

Alcohol in whatever drink or whatever quantity

it is found is liable to create thirst, so that any one who drinks any alcoholic beverage is likely to keep wanting more to drink. After a short time he may actually crave a drink with alcohol in it. Alcohol is likely to make him feel that he *must* have it, and that he cannot stop using it. And all the while the drink is injuring his health and doing harm to his body. Persons who use fermented drinks are much more liable to suffer from diseases than those who do not use them, and as a rule they do not live so long. It has been noticed by physicians, too, that when such a person meets with an accident or becomes sick he does not get well so fast as the one who drinks only pure water. It has been estimated that in our country every year over 60,000 persons were killed by alcohol; that is, by the use of drink containing it. This number of people is enough to make a good-sized city.



PEOPLE WHO EAT MUCH FRESH FRUIT DO NOT NEED TO DRINK AS MUCH WATER AS PEOPLE WHO EAT BUT LITTLE FRUIT. YOU SEE THAT OVER THREE FOURTHS OF AN APPLE IS WATER.

Most boys and girls love to visit a soda fountain for a cooling drink on a hot day. A glass of pure water charged with gas, and flavored with pure sirups or fruit juices is most pleasant. But

Soda fountain drinks.

SWEETS

Constant indulgence in sweets
(especially between meals)

Impairs the appetite

Ruins the digestion

Decays the teeth

Lays the foundation for sickness in later life



Tommy had a tummy which he stuffed with lollipops,
Chocolate and soda, taffy and gum-drops.

Tommy has dyspepsia now, Bright's Disease and gout,

"And the Gobble-uns 'll git you, ef you don't watch out!"



Said dapper Mr. Date to dried but sweet Miss Fig,

"Why is it Master Sammy is so healthy and so big?"

Said she "Upon cheap goodies, he never spends his money;

He loves raisins, figs and dates, maple sugar and pure honey."

there are many soda fountain drinks which are highly injurious, especially those which contain kola, a harmful drug. Then, many of the drinks at soda fountains are made harmful by the use of artificial sweets and poisonous coloring matter and flavors. Often the water used in making these drinks comes from an unsafe source.

REMEMBER: Pure water is the safest of all drinks. We may add to it various fruit juices if we choose, making many healthful beverages with which to quench our thirst. We shall enjoy life most if we early form the habit of —

- (1) Drinking an abundance of pure water,
- (2) Drinking it often in small quantities at a time,
- (3) If the water is very cold, taking it in sips,
- (4) Never drinking for the purpose of washing down food,
- (5) Avoiding tea, coffee, and all fermented drinks,
- (6) Eating an abundance of ripe fruits.

HEALTH PROBLEMS

1. Some people think they cannot swallow any food without taking water or milk or some other drink with it. Could you tell such a person what to do in order to be able to swallow food without washing it down with drink?

2. Show by an experiment of some sort that the following articles contain water: apples, peaches, cherries, bananas, cabbage, lettuce, potatoes.

3. How much water do you drink in a day? When do you drink it?

4. Find out where the water that you drink comes from.
5. How do you cool the water you drink in summer ?
6. When typhoid fever breaks out in a city or town, the officials at once have the drinking water examined. Why ?
7. Examine a can of fruit which has been fermented, and describe what you find. Take a little fresh fruit juice of any kind, and let it stand in the room uncovered for a few days. Describe the change which takes place in it.

REVIEW QUESTIONS

1. What proportion of the body is water ?
2. Why does the body need water ?
3. How does the body show that it needs water ?
4. How much water does one need during a day ?
5. How should one drink very cold water ? Why ?
6. From what sources is one likely to get the purest water ?
7. What can we do with impure water to make it pure ?
8. When is ice likely to be impure ?
9. What is the best way to cool water ?
10. What is the meaning of *fermentation* ?
11. What are some common *fermented* drinks ?
12. Does the use of alcoholic drinks promote good health ?
Why ?
13. Do all drinks to be found at soda fountains promote good health ? Why ?
14. Does the regular use of tea and coffee promote good health ?

CHAPTER XV

THE CHOICE AND PREPARATION OF FOOD

"PAPA," exclaimed Mary and Henry in concert as their father was going with a basket toward the garden, "may we go with you?" "Yes, ^{The food} indeed," said their father; "come right along, ^{plants in} and I will tell you about the things that grow ^{the garden.} in the garden, while you help me gather some lettuce. And since it is a holiday, you may help me plant some of the new seeds I brought home with me last night." As they went to the garden together, their father said: "You know that food for all animals grows out of the earth. The sunshine makes it grow. There are many kinds of foods, to supply our various tastes and our many needs.

"All of the fresh garden things are excellent for health. The peas are rich in building material for muscles and bones. They are especially good for growing boys and girls. The lettuce is rich in iron, which makes the blood red. An ox can live on green leaves alone, but we need other foods, although it is important that we should eat some fresh uncooked food, such as lettuce, celery, or fresh fruit, at least once a day, and at every meal, if possible.

"The asparagus, beets, and other vegetables which grow in the garden are useful both as body-building and heat-making foods. And they give a certain bulk to the food, which is necessary that the bowels may act often and promptly. When the bowels do not move often and promptly, the food remnants ferment and decay, and the poisons thus produced, when absorbed, cause headache, a coated tongue, a bad breath, a muddy complexion, colds, catarrh, and many other serious troubles. All fresh garden vegetables are good to keep digestion active and the bowels regular. The potato is one of the best of foods. Its free use helps to keep the tissues free from poisons."

The father told also of grain foods, such as wheat, of which bread is made, and oats, corn, and rice. One

The grains. thing about wheat is important to remember :

The millers, in making fine white flour, take out so much of the best of the wheat that graham bread, which is made of the whole-wheat flour, contains four times as much *bone-building* material as does fine white flour bread. Boys and girls who want to grow up sturdy and strong should eat a great deal of graham rather than fine flour bread. Graham bread also helps to keep the bowels active and regular.

The father explained that garden soil is the home of a vast multitude of small forms of life. For

**Clean fruit
and vege-
tables.**

the most part, these are harmless. But sometimes there are among them certain kinds of germs or bacteria that cause disease. Sometimes,

too, the top-dressing used to enrich the soil contains eggs of minute creatures that do injury to any one who swallows them. These get on the leaves and fruit which grow near the ground. So it is wise *always* to give such foods as lettuce, celery, cress, and strawberries a *most thorough washing* before using them. This is just as necessary if such foods are brought from the market. Cases of typhoid fever have been traced to lettuce eaten without cleansing. It is believed that other grave diseases come from the same lack of care.

“Even those fruits that grow on bushes and trees,” the father continued, “need washing, for they get covered with the dust that flies about in the air, and dust generally carries germs or bacteria along with it.

“If we gather cherries and such fruit when the sunshine has dried them off just after a good shower, we shall find them clean. But fruit which comes from the market must always be well washed before it is eaten.”

Dealers often keep stands of fruit for sale outside their door. There, the dust from the street gets to the fruit. Some people in the Institute of Hygiene in Strassburg, Germany, made a careful examination of small fruits purchased in such an open market, and found in the water, after washing strawberries, 2,000,000 living germs; from the same amount of raspberries, 4,000,000; grapes, 8,000,000; currants, 11,000,000; and cherries, 12,000,000. Quite probably

some of these were disease germs. At any rate, it is better to wash off the germs before eating the fruit.

The other day while waiting at the bank, I saw a group of boys around a huckster's cart buying apples. As soon as each had received his purchase he began to take large bites, eating both skin and pulp. The boys seemed to enjoy the fruit so much, I thought I would

bring some home. Those apples were so dirty that they had to be covered with water and soaked for five minutes, then rinsed, and rubbed with a drying cloth before they were fit for any one to eat. The boys must have gotten more than their money's worth of dirt, but let us hope they got nothing worse.



DEALERS OFTEN
LEAVE THEIR
FRUIT UNCOVERED
ON A DUSTY
STREET.

The common practice of picking up fallen fruit from the ground and eating it out of hand, is also a habit fraught with danger. One can hardly be too careful always to eat clean food.

Here is a good way to wash berries and small fruits. Put them in a colander, just a few at a time so they won't mash, and dip the colander lightly down and up several times in a basin of clean water. A lady I know always washes strawberries with their hulls on, and when it is cherries or grapes she wants to wash, or any firm fruit, she holds the colander under the faucet, and lets the water run over

the fruit for quite a while. She washes lettuce in running water. Celery she cleans by scrubbing each stalk separately with a small whisk brush. She says she always feels that she must wash huckleberries and cranberries especially clean, for one never knows whether the hands that picked them were clean or greasy and grimy with dirt.

Late in the season when the corn has grown and is bearing ears, every one ought to gather some of the tender, juicy ears to eat fresh each day. May one eat

Preparing
foods for
the table.

corn raw? Yes, it is delicious that way if gathered fresh from the stalk when each kernel is plump with the sweet juice. It is also very nice and wholesome when cooked in various ways.

One excellent way is to pick nice fresh ears of as nearly equal size as possible. Open the husks and remove all the silk

from the corn, then replace and tie the husks about the ears with a cord. Put the corn in a hot oven and bake for half an hour, or until it is tender and no longer has a raw taste. When boys go camping, they can cook corn in this way by burying it in hot ashes under live coals.

It is most important that all foods should be *fresh*, whether milk, eggs, meat, vegetables, grains, or fruit. Any stale food is likely to be harmful. Nature has



FRUITS SHOULD BE
WASHED BEFORE
THEY ARE EATEN.

provided some foods, as celery, cabbage, and apples, which may with care be kept fresh and good for use during the winter season. Many roots and tubers which ripen in the fall, such as potatoes, beets, and parsnips, provide us during the winter with variety, and supply bulk for our food.

I saw Ann canning some strawberries yesterday, and this is the way she did it. First, she cleaned a quart jar, then she filled it half full of water, fitted on the rubber and the top, and stood it bottom upwards on the table for a time to see if the water would leak out, because if it did, she would know the jar was not air-tight.



THESE APPLES ARE
BEING PICKED
WITH DIRTY HANDS
PROBABLY.

Next, she made a sirup by heating together one cup of sugar and one and a half cups of water. Next, she filled the jar with perfect strawberries that had been well washed and stemmed.

Over these she poured enough hot sirup to fill the jar to the neck. She placed the lid, but not the rubber, on the jar without screwing it down. Then putting the filled jar in a shallow pan in which was a little water, she set them in a cool oven. The heat was turned on very gradually so as not to crack the jar; at no time did she let it get so hot that the fruit juice boiled over the top of the jar. After the juice began to bubble well in the jar, the fruit was cooked

for twenty minutes. The jar was then removed from the oven, with care not to expose it to a draft, the lid was lifted quickly, and a clean rubber band, which had been dipped in hot water, was slipped over the jar. Ann filled it again to overflowing with boiling sirup and screwed the lid down (not quite tight), wiped it clean, and left it to cool for an hour. Then she screwed the lid as tight as she could.

One time Ann canned some string beans. After she had washed the beans and had taken off the strings, she cooked them till just tender. Then she put them in a jar, just as she did the berries, filled it with the boiling water in which they were cooked, and finished them as she did the strawberries, except that, as they were already cooked, she left them in the oven only long enough for them to boil in the jar.

This is such an easy way to can foods that any one who tries can do it successfully.

Every home ought to have a garden. A garden not only gives an excellent chance for exercise of a most healthful sort, but it provides many fresh foods which furnish to the body material that is not provided by other foods. They encourage appetite and aid digestion. It is very necessary that food should be relished. When one has a keen appetite and a good relish for the food he eats, he is almost always able to



DO NOT EAT FRUITS
WITHOUT WASHING
OR PARING THEM.

digest it and so he is benefited by it. Whereas, when one eats without an appetite, his food is not likely to be well digested, and it will not nourish him well.

Professor Pawlow, the great Russian scientist, has made a number of wonderful discoveries by means of large and very intelligent dogs which he trained to assist him in the study of digestion. The "ap-
petite
juice."

By experiments upon these dogs, Professor Pawlow learned, among other interesting things, that the stomach prepares a digestive juice to act upon the food while it is still in the mouth, and before any portion of it has been swallowed. The simple taste of food causes an abundant outflow of this juice. The juice thus formed Pawlow calls *appetite juice*. In order that the proper amount of "appetite juice" should be produced, it is necessary that the food should be very thoroughly chewed. When food is swallowed hastily, it reaches the stomach before the latter is prepared to receive it and finds no juice ready to digest it. Professor Pawlow made many other wonderful discoveries about digestion, of which we shall learn in future lessons.

REMEMBER: All fresh garden vegetables are excellent for health, furnishing body-building and heat-making foods, and assisting the body to get rid of useless remnants of food. Fruits and grains also make excellent foods. The fruits and vegetables should always be cleaned before eating; and the *whole* of the grain, except the hull, is better for food than the white part

merely. A keen appetite and a good relish for food is always necessary.

HEALTH PROBLEMS

1. Many of the vegetables that grow in the garden may be eaten raw. Are they better when cooked? Why?

2. Many of the common vegetables must always be cooked. Why?

3. Many of the common fruits you like better cooked than uncooked. Why?

4. Are there any fruits that may be eaten when green? Why not?

5. How may oats be used for food? Corn?

6. In canning fruit, why must one be so careful to boil the fruit and the sirup, and seal the can air-tight while the contents are hot?

7. What is the best way to get a good appetite? Do you have a good appetite when you lie around the house all day? Why?

8. What foods do you always have a keen relish for? Would it be right for you to eat only those foods? Tell why.

REVIEW QUESTIONS

1. What should be done to garden vegetables before eating them?

2. What grains are good for food?

3. Why is graham bread better for growing boys and girls than white bread?

4. Why should fruits always be washed before they are eaten?

5. What is a good way to wash berries? Celery?

6. Why does lemon juice *sometimes* purify water?

7. Is corn on the cob good for food? How should it be cooked?
8. Is a potato good for food? How should it be cooked?
9. Tell how fruits and vegetables may be kept in good condition for use during the winter.
10. Why is a keen appetite necessary for good digestion?

CHAPTER XVI

THE CARE OF THE MOUTH

SCHOOL had closed for Easter vacation, and George was going to his uncle to spend a week in the country. He put his clothing and all the things he thought he should need in his satchel. With cap in hand, he stood waiting for his uncle to come for him. He could not help thinking how fine it was going to be to pick wild flowers in the woods, and play as much as he wanted to in the fresh out-of-doors, with no lessons to learn and no tasks for a whole week.

His mother, coming in with Uncle Tom, to see if George was ready, asked him: "Sure you have everything? Have you your toothbrush?" "Why, no, mamma," said George; "I thought I was going on a vacation." "Certainly," replied his mother, "but whatever you do there is never a day when you can leave your toothbrush behind you." Was the mother right? Why?

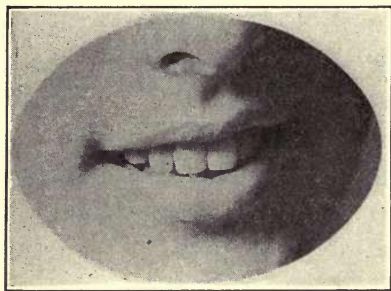
Teeth have a most important share in keeping the body in health. It is only through their aid that we can bite and crush all the solid foods Starting the food right. we take into our mouths. In fact, their chief business is crushing and grinding food. If this is not

done well, then the very first work in getting the good out of food is left unfinished, and through all the rest of the process there will be trouble, because the food is not started off right at the beginning.

Of course, one cannot chew his food properly unless he has good tools to do it with. Even if there be but one bad tooth, or a single one missing, the chewing of food is likely to be imperfect. To do the work in the best manner requires a full set of healthy teeth.

Nature provides a young child with a set of twenty teeth, all that his little jaws are able to hold. These

The teeth. are for use only during the early years, and are called *temporary* teeth. As growth proceeds, and the size of the jaws increases, these first teeth drop out from time to time, and a larger set of



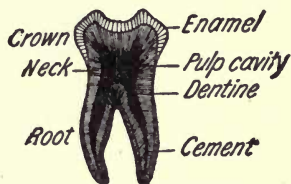
CLEAN SOUND TEETH, STANDING LIKE
SOLDIERS ALL IN A ROW.

thirty-two teeth finally takes their place. These last are called the *permanent* teeth. They are longer and stronger than the first set, and are intended for use during the remainder of one's life. If any of these are lost, others will not come to replace them.

When the teeth first appear in the mouth, they are sound, white, and beautiful, and with good care from the beginning they may be kept so till old age. Clean,

sound teeth, standing like soldiers all in a row, add much to a person's appearance. This is another reason why the teeth should receive the best care. When we see a person in whose mouth is a set of dirty, ill-kept teeth, we get much the same impression of him that we do of a person whose hands and face are dirty, or whose clothing is torn and soiled; or of a farmer whose fences are tumbling down, and whose garden is full of weeds.

The chewing surface of a tooth is called its *crown*. This is protected all over with *enamel*, the very hardest material in the body. The portion of the tooth within the *gums* is called its *neck*. To hold it in position, it is firmly fastened by a *fang* or *root* to the jaw bone. There are different shaped teeth for different uses,—some sharp for cutting the food, while others have broader surface for crushing and grinding. We have no teeth for tearing food, such as are found in the mouth of the dog, as we have no use for such teeth. See if you can locate these different shaped teeth in the mouth.



WHAT IS LIKELY TO HAPPEN
WHEN THE ENAMEL DECAYS
OR IS BROKEN SO THAT THE
NERVE IS EXPOSED?

All are made good and strong on purpose, so that they can readily crush hard foods like crackers and toast. One's teeth need exercise to keep them strong quite as much as do other parts of the body, so at every meal we should eat some hard

The teeth
need exer-
cise.

foods which need much chewing. But the teeth are not so strong that they can be used to crack such things as hickory nuts. The enamel which covers the teeth is brittle, like china, and if the teeth are used to bite hard objects, such as steel or stone, it may be very easily cracked or chipped off. So long as the enamel remains sound, the tooth is well protected.



THE TEETH. WHICH ARE
USED FOR CUTTING?
WHICH FOR GRINDING?

You have already been told of the tiny colorless plants so small that six hundred millions (600,000,000) of them could be packed in the space occupied by a grain of sugar.

Men of science call these minute plants *bacteria* or *germs*. They abound in the air. They get into the water we drink and the food we eat. Some of them are harmless, but others do us much damage. Their chief business is to carry on the process of *decay*. They multiply very fast if they have a warm place and moist food. They

Bacteria cannot live in strong sunlight. When they
in the get into our mouths, as they are always doing
mouth. from the air or by means of our food and
drink, they find just what they like best, — warmth
and moisture. And if there be ever so tiny a crack
or break in the enamel of a tooth, they seek a lodging
there, and begin to grow, and to make trouble for us.
Anything likely to injure the enamel, like biting wire,
pulling out nails, or opening a knife blade with the

teeth, or picking them with pins, should be avoided. Why? Have you ever broken the enamel on one of your own teeth? If so, how did you do it?

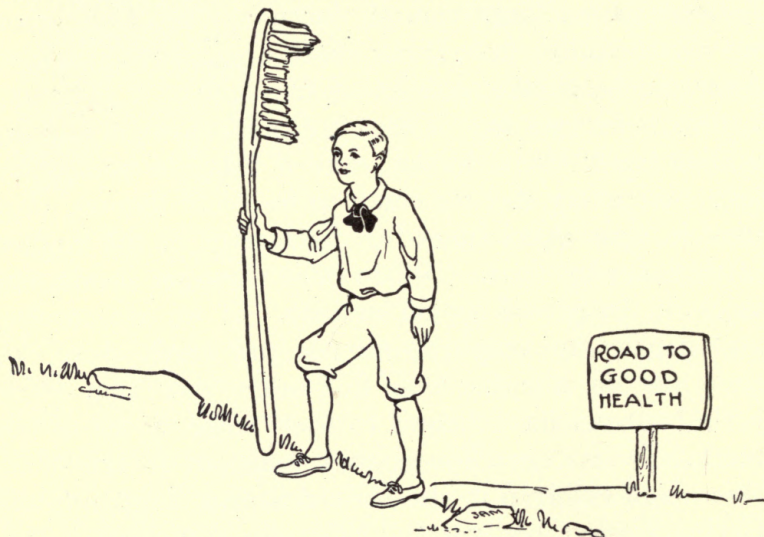
The teeth grow very close together, so each one can help the others in chewing. Still there is a space between them large enough for particles of the food we eat to collect in. If our teeth are not well cleaned after meals, these particles of food make a tempting banquet for germs. They are not slow in taking advantage of their chance; and if there be some food left there every day for them to feed and live on, they may in time make holes for themselves in the enamel of the near-by teeth. When once they get inside, the work of decay will go on rapidly. If we are careless and neglect to keep the mouth and teeth clean, we need not be surprised to find some day that these little bacteria have begun to spoil some or all of our teeth. It has been found that nine out of ten of all the school children in the United States, England, and Germany have bad teeth. Why, do you think?

A decaying tooth is literally swarming with bacteria, and not a morsel of food can be chewed in the mouth but that some of them get mixed in with it, and pass into the stomach to do further harm to the body.

You know that to be sound a horse must have good teeth. This is just as true of a man as of a horse. A man who does not have good teeth is not a sound man.

Some people think it is not necessary to care for the

first set of teeth, since they will be shed after a time. But this is a mistake. A "baby" tooth that decays is very apt to harm the new tooth that comes in its place. One that is not pulled in time causes the second to be crowded and irregular.



Even the baby's teeth need to be kept clean. A swab of cotton on a toothpick is best for this, because the baby's gums are too tender to bear the use of a toothbrush. For older boys and girls a small, stiff brush is best, — one that will reach into every crevice. It should be used on every part of every tooth, outside, behind, on top, and between, brushing *up* on the lower teeth and *down* on the upper ones. Where the

Keeping
the mouth
clean and
the teeth
sound.

teeth are very close, soft silk thread or dental floss should be drawn around and between the teeth to clean out small bits of food.

All persons, young and old, should make it a regular practice to finish every meal with a thorough cleaning of mouth and teeth. When the school bell rings before dinner is over, and one's toothbrush is in the bathroom up stairs, one should at least rinse his mouth well with a glassful of water, and not forget to clean his teeth at night thoroughly. In some countries the meal service is concluded by the passing of glasses and bowls for mouth washing, as well as finger bowls for finger washing.

If it is one's misfortune to have a decayed tooth, he should at once visit a good dentist, who may be able to clean it out, and fill it with some lasting substance, which will prevent any further damage, and make the tooth still of service in chewing. One should not delay in attending to this, or the tooth may be wholly destroyed. And it is a serious thing to lose even one tooth.

We cannot always ourselves see where the germs have started their work. The teeth, by aching most painfully, often make known to us that the bacteria are at work. But by this time much harm has already been done. It is wiser to make regular visits to some good dentist twice a year at least, and have him examine the teeth and clean them. The high polish which he will give them makes it harder for the food

and germs to cling to them ; and if there be any places where the enamel is broken or decay begun, he can repair the tooth before great harm has been done.

There are various routes, beside those already mentioned, by which these bacteria reach the mouth. A not unusual way lies through the habit, so common among children, of holding in the mouth pins, pennies, pencils, marbles, and other articles liable to carry bacteria. The practice of swapping bites of candy, exchanging chewing gum, whistles, or anything that has been put in the mouth, wetting a lead pencil with the lips, tasting with another child's spoon, and drinking from a common cup are other ways of getting these dangerous germs into one's mouth.

One very common harmful habit is that of putting the fingers in the mouth. The fingers more than any other part of the body are all the time coming in contact with things that are more or less unclean. Things handled by many people, as books, door knobs, the stair railing, the baseball or bat, may each or all have on them harmful bacteria which have come from some one's hands. These may get on your own hands. If you should then put your fingers in your mouth, what would probably happen ?

Of two things we cannot be too careful :

1. To wash the hands very often,
2. To keep the fingers out of the mouth and also out of the nose and eyes.



THIS IS THE SAFE WAY TO GET A DRINK.

By some experiments made with a drinking cup in a city school, it was found that in a space no larger than the head of a pin on the brim of a cup which had been in use for nine days, there were over one thousand bacteria. It was estimated that the edge of the cup likely to be touched by the lips in drinking bore not less than five million germs. In one school twenty-four persons who drank from a cup that had been used by a pupil

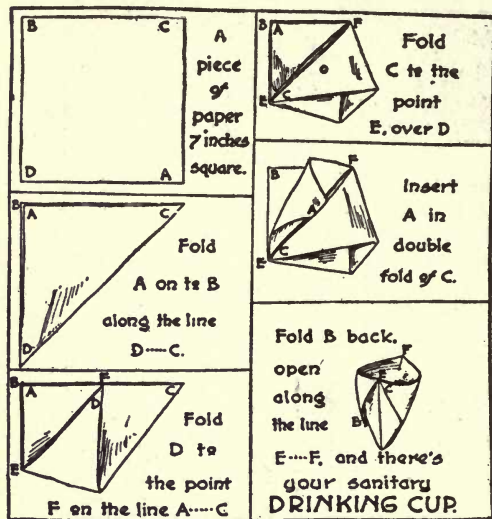
Avoid the
public
drinking
cup!

having diphtheria all took the disease. In another school the teacher and every pupil who used a cup from which a child with the measles had drunk became

ill with measles.

It will do us little good to drink pure water, if in doing so we offer to injurious germs a lodging place in the mouth.

The public or common drinking cup is a deadly thing, and no one should use it. Every person should carry a



pocket cup of his own. If one needs a drink when no cup is at hand, he may make one by folding a piece of paper, or he may use an envelope. A bubble fountain is an excellent and safe device for providing the public with drinking water.

REMEMBER: Sound teeth are necessary for good health. The teeth should be cleansed thoroughly after each meal; and they should be examined regularly by a good dentist. The mouth is a door to the body. Keep it closed against germs.

HEALTH PROBLEMS

1. If you can do so, look at the teeth of a three-year-old child and describe their appearance and their condition.
2. Where in the mouth are the teeth used for cutting food? Where are those used for crushing food?
3. What may happen to one's teeth if he uses them for biting wire or nails?
4. How many of the people you know have perfectly sound teeth? How have they kept them in good condition?
5. Suppose one should always gulp down his food without grinding it, or should eat only mushes, what would happen to his teeth? Why?
6. Try to figure out which will take more time: to rinse or brush one's teeth after each meal, or to have one or two decaying teeth filled by a dentist each year. Which is more trouble and expense?

REVIEW QUESTIONS

1. What part do the teeth play in keeping the body in health?
2. What are the "baby" or temporary teeth? the permanent teeth?
3. What may cause teeth to decay?
4. What is the crown of a tooth?
5. What is the enamel? What is its use?
6. What will happen to the teeth if the enamel is broken?
7. How may the teeth be exercised?
8. What is meant by *bacteria* or *germs* in the mouth?
9. What will help the growth of germs in the mouth?
10. How often should one clean the teeth?
11. How should the cleaning be done?
12. How often should one visit the dentist? Why?

CHAPTER XVII

THE CARE OF THE SKIN

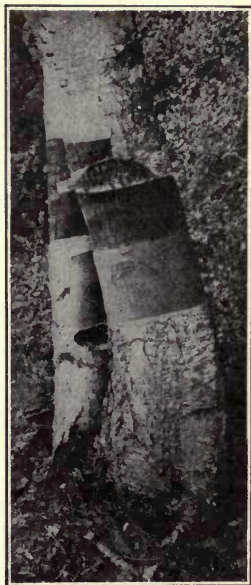
ANY one who has ever had the mishap to tear a piece of skin from a finger, toe, or other part of the body knows how the tender flesh underneath smarts and stings until it is protected from the air by a bandage or plaster. One who has had the bad luck to get dust or dirt in such a raw place has probably had to endure a painful sore.

It is plain that without a covering for the delicate flesh, the body would be in constant danger of injury from hurt and from germs. The skin, which clothes the whole body, protects the sensitive flesh. The skin is soft and smooth. It stretches enough for us to bend easily an arm or leg, and it is never too small, no matter how much we grow. It is so strong that it does not break easily when we come in contact with hard objects, and it never wears out. It fits so perfectly that it has the exact shape of the body. At the lips and nose it becomes finer and softer and is called the *mucous membrane*. This membrane lines the nose, mouth, throat, and all the inner portion of the body.

Some people like to strip the spicy bark from a birch tree and chew it. If you have ever done this, or have peeled the bark from some other young tree, you have doubtless observed that on the outside there was first a very thin layer resembling paper, and under this a much thicker bark next to the wood. It would not do the tree much harm if you should remove this outer bark. Indeed, the bark of white birch trees peels itself off little by little. The bark of the tree does not stretch enough to make room for the increase in size as the tree grows; so the outer layer tears, is shed as the wood beneath it needs more room, and then the new bark grows to take its place.

If you tear off the inner bark, it will injure the tree. It will make it "bleed"; that is, it will cause the sap to flow freely. The sap, we may say, is the blood of the tree. If the torn place is not too large, it may heal over, but an ugly scar will remain in its place.

The skin covering our bodies, like the bark covering the tree, is made up of two layers. The outer layer is called the *scarfskin* or *The scarf-epidermis*. It is thin, like the skin that lines *skin*. an eggshell. There is no blood in this outer skin;



THE OUTER BARK OF THE
BIRCH TREE.

neither is it very sensitive. Using a very fine needle and thread, you can take a stitch in it without making it bleed or without causing pain. If you should examine a bit of the scarfskin under a microscope, it would look like this picture. There are several thin



A SECTION OF THE SCARFSKIN SEEN THROUGH THE MICROSCOPE.

layers of small scales, joined at their edges. Those in the outside layer are no longer of use, and are all the time being shed or rubbed off. Every time the hands are washed with soap and water or rubbed with a towel some of these scales are rubbed off. It is a curious fact that new ones are all the time crowding the old scales upward to the top.

On most of the body the outer skin is very thin. It is thickest usually on the palms of the hand and the soles

of the feet, because these parts more often come in contact with hard objects, and hence need better protection. Can you locate the tough parts on your hands and feet? Is there some such thick skin on any other part of the body?

The underside of the first skin is colored, being spread over with tiny grains of coloring matter called *pigment*. In colored people this pigment is sometimes brown, and sometimes nearly black. White persons have very little of it. The heat of the sun increases the pigment, and this is why the skin tans when much exposed to the sunshine. If the coloring increases in spots, the skin appears *freckled*.

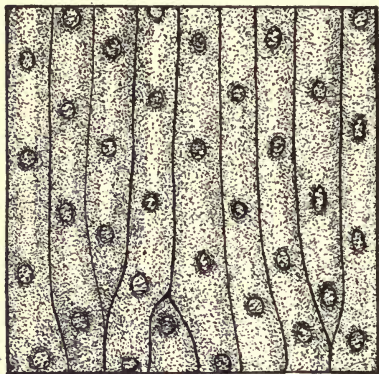
The inner or second layer of skin on the body, like the inner bark of the tree, is much thicker than the outer layer; it is also more important, and The true skin. so is called the *true* skin, or *dermis*.

If we scratch or cut this skin, it bleeds and smarts. If we should meet with a mishap which destroyed a portion of it, there would be a scar when it healed, — a sort of patch by which Nature tries to remedy the defect. Have you a scar of this sort? How did you get it?

Besides protecting the body from injury, the skin serves it in several other ways. We can tell by means of it whether objects are rough or smooth, whether hard or soft, and whether cold or hot.

If we look through a magnifying glass at the palm of the hand, we shall find it covered with very fine ridges

and furrows. Along the top of the ridges appear many little dark spots. These are very tiny holes called *pores*.

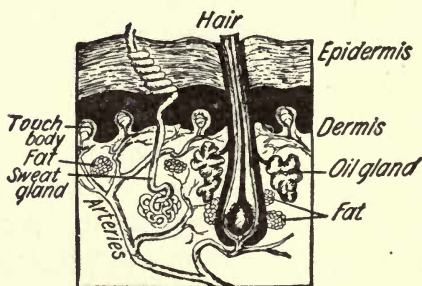


SKIN OF THE PALM OF HAND
(magnified).

Each pore is the opening for a very small tube which runs down through both layers of the skin. At the lower end it is rolled up in a coil, as you see in the picture. These coils are *perspiratory glands*, so called because they separate out from the blood the fluid we call *sweat* or *perspiration*. There are more than three millions of them in the

skin, but they are most numerous on the palms of the hands and the soles of the feet. These glands are always busy at work sending out perspiration through the pores, although we usually do not notice it except when it flows so fast that it forms in drops.

We can make sure that the skin secretes moisture by trying a simple experiment. Press the



THE SWEAT OR PERSPIRATION GLANDS.
YOU CAN ALSO SEE AN OIL GLAND.

finger tips or the whole hand for a moment on the dry surface of a mirror or some brightly polished metal. The place which the hand covers will look moist and dim. This is because perspiration oozed out of the pores of the hand while it was on the glass, though we could not see it by merely looking at the hand.

When one is working or playing hard, or when he gets very warm, the perspiration flows so freely that it collects on the surface of the skin in big drops. But at other times it flows slowly and we do not see it. Yet during each twenty-four hours almost enough to fill a quart measure passes from the body of an adult. If one is working hard, the amount given out may be very much greater than this.

As soon as the perspiration reaches the surface, it evaporates, and in so doing makes the body cool. This is another useful thing the skin does for us.

It helps to keep us cool in hot weather; or, in other words, it regulates the heat of the body. When the perspiration pours out fast, we should take care not to sit in a wind or a draught, as we might be chilled by the rapid evaporation of the moisture.

How the
skin regu-
lates the
body
heat.

You can see how this happens by moistening the finger nail, and blowing upon it. Although the breath is warm, the nail will feel cool because of the rapid evaporation of moisture.

The perspiration is mostly water, so the more we perspire the more water we need to drink in order to

keep the proper supply of moisture in the body. It also contains a considerable amount of waste matter formed in the body. Thus the skin serves another purpose — it rids the body of waste.

There are other glands in the skin besides the perspiratory glands. These make oil, and pour it out upon the surface to keep the skin soft and smooth. Show in some way that the surface of the skin is oily.



WHY DO WE FEEL
THIRSTY IN HOT
WEATHER?

There are curious little pockets, too, from each of which grows a hair. Oil glands provide the hair with oil to keep it soft and glossy. Show in some manner that these oil glands supply oil for the hair.

The nails of the fingers and toes grow out of other little pockets in the skin. Both hair and nails are only portions of the outer skin, which is curiously changed and hardened. The nails were intended to protect the ends of the fingers and toes, and to give them firmness.

The appearance of the skin more than any other feature makes the face ugly or beautiful.

A healthy
skin must
be clean.

In order to keep the skin in health it must be kept clean. The waste matter which forms a part of the perspiration does not evaporate along with the water, but dries upon the skin, making a sort of film all over the surface. If this is not re-

moved, the film begins to decompose, giving rise to a very unpleasant odor. But the offensive smell is not the worst thing. The poisons formed are absorbed into the body and produce various painful and disgusting diseases of the skin.

Sometimes people try to hide a dingy skin on the face by covering it with paint or powder. This is a sham. It does not help the real trouble at all. The skin cannot be made soft and white by such means. Besides, these paints and powders sometimes contain poison.

The really beautiful skin is the healthy skin. And as we saw above, to keep the skin healthy, it must be kept clean so that its perspiratory glands will be active, and its pores kept open. Indeed, the whole body must be kept clean, — clean on the outside and clean on the inside, — that the skin may be kept in health. A clean, moist, healthy skin is the sign Nature hangs on the outside to indicate that the whole body is in good health.

Most children wash the face and hands every morning upon rising. The rest of the body needs this care just as much or even more than do the hands and face. The air and sunshine bathe the face and keep its skin much freer from the body's waste than are the parts of the body which are covered with clothing. Why? The entire skin should have a daily cleansing. A morning bath is an important health habit. For a person in health, a cool or cold bath is best, because it not only serves to cleanse the skin, but it makes one feel fresh and full of energy. Cold water,

Bathing.

too, hardens and trains the skin and makes one less liable to colds. The person who makes it a habit to take a cool or cold rub regularly every morning will soon have his skin so trained that he will be protected against "colds."



THERE SHOULD BE A
BATH THERMOMETER
IN EVERY BATHROOM.

The temperature for what is called a *cool* bath ranges from 70° to 80° , the *cold* bath from 60° to 70° . One should test the water with a bath thermometer.

If one is not used to cold-water bathing, he should always begin with moderately cool water, and gradually make it colder.

In this way one can, after a time, take a cold bath with no harm to himself. There are some points, though, which one should always bear in mind when taking a cold morning bath:

1. The room in which the bath is to be taken *must be warm* (70° to 80°).
2. Always bathe the face and neck first with cold water before bathing the rest of the body.
3. The cold bath should be taken *at once upon rising, while the whole body is still warm*. It is not safe to run about barefooted and in night garments after getting out of bed before taking a cold bath. *A cold bath to a cold body is a dangerous thing.*
4. If on getting up in the morning the hands or feet are cold, or one feels at all shivery, a short (2 to 4 minutes) hot bath should

first be taken to warm the body, and after that the cold bath may be taken. If there is no hot water, warm the body first by rubbing it with a towel; or by some brisk exercise, such as jumping up and down for a moment or two.

5. Cool or cold baths should be of *short duration*. One minute is long enough. The colder the water the shorter should be the bath.

6. After a cool or cold bath, every part of the body should be briskly rubbed over with a coarse towel until it *looks red* and feels warm.

7. The drying should always be quickly and thoroughly done.

Cool and cold baths may best be taken by a plunge in a tub full of water of the proper temperature, or by a shower or spray of water over the entire body, while standing with the feet in warm water.

If one has no spray apparatus, a small tin watering can, such as the gardener uses to water flowers, filled with cool water will serve as well.

A boy who wanted a shower bath each morning fixed one for himself by suspending from the ceiling just over a wash tub a large tin pan, the bottom of which he had punched full of holes. Above this he hung a tin can to be filled with water. A hole in the bottom of the can was stoppered with a large cork. To this cork he tied a long string so that when he stepped into the tub he could pull the string, thus draw out the cork, and let the water out into the pan to fall on him in a shower.

One can take a cold rub with just a wash bowl full of water, and two coarse towels. Bathe first the face and neck, then the arms and chest, abdomen, back, limbs,

and feet in this order. Dash the water over the skin with the hands and rub fast and hard. Dry each part well before wetting another. For the back, wet one of the towels, fold it lengthwise and wring nearly dry. Then with one end over the left shoulder and the other under the right arm rub crosswise. Then change to the other shoulder. Dry in the same manner.

When one has no conveniences for a cold-water bath, he may take a cold-air bath. A good way to do this is to

A cold-air bath. sleep with one's windows open to the outer air.

In the morning jump out of bed, disrobe quickly, and with a coarse towel, or better still, coarse mittens made of toweling worn upon the hands, rub every part of the body hard and fast while exposing it to the air for a half minute in winter time, and for three or four minutes or longer in warmer weather.

One should always feel warm and in a glow at the end of a cold bath. If after any cold bath you feel shivery or cold when well dried, then something is wrong. Probably the bath was too long. Anyway, the thing to do is to exercise hard until you are warm. Next time make the bath shorter.

If you feel giddy or faint in a warm bath, leave it at once, dash cold water over the body, lie down, sip cold water, and put cold water on the face and head.

Besides the daily morning bath to exercise the skin, one needs a warm cleansing soap-and-water bath at least twice a week. In warm weather, cleansing baths are needed more often.

The best time for warm (95° – 98°) baths is at night just before going to bed. It should always be the rule to end the warm bath with an all-over dash of cooler water.

Hot baths (above 100°) need rarely to be taken except in illness. Most people like a tub bath pretty warm. Some children take hot baths so The hot often or remain in such a bath so long that it bath. gives them a weak and languid feeling, and makes the skin so sensitive that they take cold very easily.

A hot bath, when one is in health, should be very brief; and always at its close the body should be cooled off in some quick or sudden manner, with a spray or shower, or with a dipperful of cold water dashed over the entire body.

Should one bathe just before or soon after eating? Why? Should one exercise vigorously after a cold bath? Why? Should one rest after a warm bath? Should one ever take a cold bath when very tired, or when perspiring? Why?

There are some races of people who, while living in a climate quite like ours, have such well-trained skins that they do not at all mind the cold, although The well-trained they wear very little clothing. A gentleman skin. who was traveling in the West recently met an American Indian working without either shirt or coat. It was a cold, chilly day, and the gentleman in surprise asked the Indian, "Are you not cold?" The Indian replied by asking, "Is your face cold?" "Why,

no," replied the man. "Well," said the red man, "the Indian all face." The skin of his body had become so used to the air it did not feel the cold any more than our faces do.

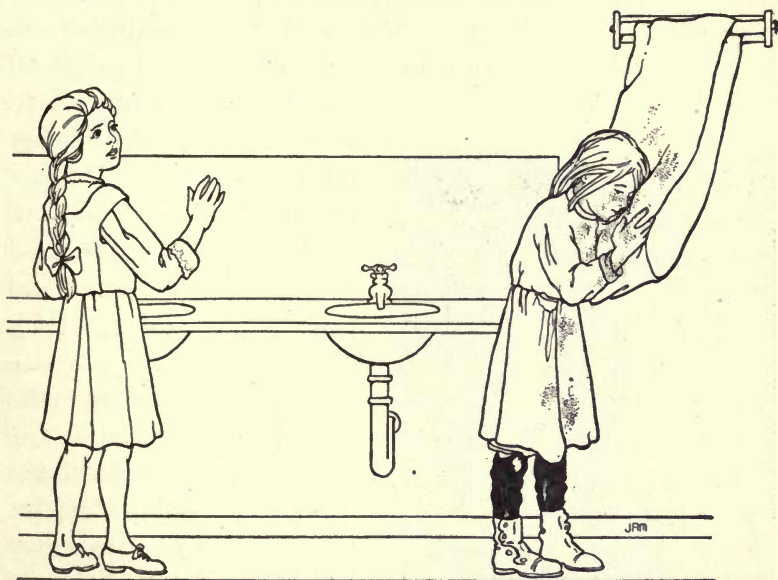
Some parts of our body require more frequent cleansing than others. Our hands, which come in contact so often with dust and dirt, need to be washed **Hygienic working.** several times a day. Should one always wash them before eating? Why? If possible to do so, it is best to wash them with soap in a running stream of water, as under a faucet. Water in a basin soon becomes foul. If we must wash in a basin, we should use a second or even a third basinful to rinse the hands. The hands ought always to be made very clean before using them in washing the face. In bathing the face, rub the eyelids from without inward toward the nose.

Wash cloths and nail brushes must be clean and not too coarse. A sour-smelling or musty wash cloth must be washed with soap and water before it can be safely used.

Pure soap is also important. Most children prefer a scented soap, but they should know it to be pure. Very poor soap often has a pleasant smell. Mottled castile soap is safe and pure. Soap used on the skin should always be thoroughly rinsed off with clean water, and then the skin should be well dried with a clean towel. Lack of care in this respect often causes the skin to chap.

Never dry hands or face on public towels which some other person has used. If your school is not provided

with individual towels, you should bring your own from home just as you do your drinking cup. Even in one's home, each person should have a separate towel. Some most loathsome diseases may be con-



VERY BAD DISEASES ARE SOMETIMES CAUGHT BY USING TOWELS WHICH HAVE BEEN USED BY OTHER PERSONS.

veyed from one person to another through the use of towels. It is best always for each person to have his own toilet articles.

The hair and scalp (that portion of the head upon which the hair grows) need to be kept clean. A thorough brushing of the hair for five minutes every

day aids in keeping it clean, and makes it grow. Do you know why?

There are no set rules as to how often to wash the hair. It should be cleaned whenever it is dirty. When one lives much amid dust and dirt, the hair as well as the body will need washing often.

As we have seen, nature provides the hair with oil from little glands in the skin. If the hair be kept clean

and healthy, no other oil will be needed. Hair oils used on the scalp are likely to become rancid or foul in the hair, and they gather dust; they should therefore be avoided. Rubbing the scalp briskly with the fingers, which have been dipped in cold water, for two or three minutes every day will help to keep it healthy.



YOU CANNOT HAVE A GOOD HEAD OF HAIR
UNLESS YOU TAKE CARE OF IT.

To wash the hair, a bowl, a pitcher of tepid water, one of cold water, some pure soap, and plenty of fluffy towels will be needed. Begin by brushing the hair upwards towards the top of the head (it is easier to handle from the front) and make sure that it is straight. If the hair is tangled when it goes into the water, it will

come out tangled. When well brushed out, oil the free ends. Make a good lather with the soap. Rub this well through the hair and over the scalp with the ends of the fingers. Afterwards, the soap must be wholly rinsed off. A warm spray is best for this, but the hair may be dipped in and out of a bowl of water, changing the water two or three times. Finish with a gentle dash of cold water to prevent taking cold. Dry by rubbing the hair between soft towels, gently shaking it in the outdoor air and sunshine in warm weather. In cold weather the heated air rising from the furnace will help to dry the hair. Always brush the hair out while damp, as it is then easier to straighten.

Hair needs sunshine and fresh air, so that the less it is covered the better. Hats and caps should be worn only out of doors. Combs and brushes for use on the hair should be kept clean. A lady I know makes her brushes clean in this way: she puts a dessert spoonful of ammonia into a quart of water, then dips the brushes up and down in it, taking care not to wet the backs. In two or three minutes the dirt comes out. Then in the same way she dips them in clean water to rinse them, shakes the water out, and dries them on a rack.

Finger nails need special attention, not only because dirty nails appear untidy, but because the dirt which collects underneath them often has Caring for the nails. mixed with it some of the worst kind of disease germs. The nails may be kept clean very easily. When washing the hands, scrub the finger

nails with a brush, and clean with an orange-wood stick.

It is not wise to clean the nails while dry with a knife or other sharp metal instrument which will scrape the nail. Such treatment will make the nail rough, and



NAILS "IN MOURNING."



CLEAN NAILS ADD MUCH
TO ONE'S LOOKS.

harder to clean the next time. The nails should never be bitten or torn off. Trim them carefully and evenly with sharp nail scissors.

When a person walks much in dust and dirt, his feet should have a daily bath at bedtime, whether he takes a full bath or not. If one goes barefoot or if the feet sweat much, nothing will answer except a tepid water-and-soap bath, with careful rinsing afterward in cold water. When the feet are thoroughly

dried with a soft towel, it is a good time to attend to the toe nails, which like those of the fingers should be kept clean and well trimmed. Cut them straight across, never round or pointed, as this is liable to make them grow into the flesh.

REMEMBER: Every machine needs to be made clean before it can do good work. The person who takes care to keep all parts of the body clean can work better, study better, and will feel better than one who is careless in this respect.

HEALTH PROBLEMS

1. Compare the inside of the lips with the skin covering the hands as to fineness and delicacy. Explain the difference.

2. Why should the *scarfskin* or *epidermis* not be very sensitive? What would happen to us if it were very sensitive?

3. Have you ever had callous places on your hands or feet? What are they? Do they hurt when you pinch them? Why?

4. Rub your hands or fingers over a piece of writing paper a number of times, and then see whether you can make a clear mark on it with pencil or pen. Explain.

5. What would happen if one should smear his skin all over with a paint which would stop every pore? Why?

6. Which would use up more time, do you think, to take a cold rub every morning, or to be laid up with a "cold" for two or three weeks every winter?

7. Should a person use on his hair a brush or comb which has been used by other persons? Why?

REVIEW QUESTIONS

1. What is *scarfskin* or *epidermis*? What is its use?

2. What is the *true* skin, or *dermis*? What is its use?

3. What is the pigment and where is it located ?
4. What is the meaning of "getting tanned ?" What causes freckles ?
5. What is *sweat* or *perspiration* ?
6. Is perspiration good for the body ? Why ?
7. Why should not one sit in a cold draught just after perspiring freely ?
8. How must the skin be cared for in order to keep it smooth and beautiful ?
9. How does the skin get the oil needed to keep it soft and elastic ?
10. How often should one bathe the entire body ? What is the best time for this bath ?
11. What should be the temperature of the bath at night ?
In the morning ?
12. How should one take his morning rub ?
13. What dangers should be avoided in taking a cold or a warm bath ?
14. How should one finish a hot bath ?
15. How should one care for the hair ? for the nails ?
16. How can one avoid "hang nails" ?

CHAPTER XVIII

CLOTHING THE BODY

Do you know that all machinery when at work makes heat? The working of the living machinery within the body creates heat. The harder it works the more heat it produces. If all the heat remained in the body, we should feel much too warm, as one does when he has a fever. So Nature has arranged for the skin to carry off some of it through the perspiration, and in other ways of which we shall learn later. It happens then that almost all the surplus heat of the body escapes from the skin.

One of the chief reasons for wearing clothes is to prevent the too rapid loss of this heat. Clothes in themselves furnish us no heat. They keep us warm, but they do so by helping to retain the heat of the body. The kinds of cloth which do this best make what we call the warmest clothing. For this reason we choose woolens for cold-weather wear. Linen, cotton, and silk, which permit the heat to pass away from the body much faster than wool, make cooler garments for summer use. Too much clothing makes the skin very sensitive, and in this way one becomes subject to colds.

Some years ago I visited a school for Indian children in New Mexico. The boys and girls who attended it had, while living with their parents, worn no clothing. They were used to plunging into water and swimming like ducks, even in the coldest weather found in New Mexico. So active had their skin become that they did not at all mind weather changes. When they came to school, they adopted the fashion of wearing clothes like other children. In a short time they began to suffer with the colds, coughs, and sore throats from which they had before been free.

Just how much clothing one ought to wear depends upon several things :

1. How the skin has been trained. A skin that is kept healthy by cleanliness, and the use of the daily cold bath requires less clothing than a neglected skin.

The proper amount of clothing.

2. Age and health. Old people, babies, and persons in ill health, being less able to resist cold than others, require more protection by clothing.

3. One's habits of living. Those who live in warm rooms during cold weather need little if any more clothing while indoors than they wear in summer. Upon going out-of-doors, even if it be but for a few minutes stay, additional garments should be put on. We require while exercising less clothing than when inactive. Why ?

4. The weather. We must vary our clothing to suit the weather. We ought not to make a rule that

because it is summer we will wear thin clothing all the time, or that since it is April, we will leave off our winter underclothing. Cold days occur in summer and warm ones in winter. Even the warmest day of summer may be changed to a cool one in a few hours by a thunder shower. One ought to adapt his clothing to the weather regardless of the season.

When going out-of-doors in cold or wet weather, one should wear extra garments on the feet and limbs as well as the upper part of the body. These should at once be removed on coming into the house. Outdoor wraps should not be so heavy as to tire one in wearing them, nor so warm as to cause perspiration. Several thin layers of cloth keep us warmer than one thick one of equal weight, because between each two garments is a layer of air which helps to hold the warmth.

All kinds of clothing should be porous, that is, should permit the air to pass through. Chamois jackets and rubber raincoats which we sometimes need to protect us from wet and cold are air-proof, and not suited for constant use. With no air to evaporate it, the perspiration from the skin clings to the body and the clothing. After taking off a raincoat which has been worn for some time, the clothing is often so wet



WHY IS MARY
SHIVERING WITH
COLD?

that the air will soon chill one. Unless one changes his clothing quickly or exercises until his clothing becomes dry, he may get a severe cold. Rubbers make the shoes and stockings damp in the same way. They should not be worn indoors. It is a good plan on taking them off to change to dry shoes and stockings. Rubbers after being worn should be dried before wearing them again.

If on the way to school you should be caught in a shower and get your clothing wet, ask your teacher to **Wet clothing.** allow you to go home and make a change, or to permit you to keep exercising until your clothes are dry. Even when sitting or standing, one may exercise vigorously by contracting the muscles so as to make them tense and hard.

If the feet get wet, the shoes and stockings should be changed as soon as possible. But first, if the feet have been wet for some time and are cold, put them in a bath of hot water for a few minutes, until warm and well reddened. Lift the feet from the hot water, and dash a dipperful of cold water over them; then rub them dry with a coarse towel. Cold feet may also be warmed by first rubbing with cold water then with a dry towel. Woodsmen sometimes warm their freezing feet by rubbing them with snow.

Quite likely you have never thought that the color of a garment makes any difference in its **The color important.** warmth, but it does. If you have ever seen a polar bear you know that its coat is white; and white is

the color of the fur of many other animals in the cold North. This is no doubt for a purpose, as white garments are warmer in cold weather, except in the bright sunshine, than those of darker color. White and light-colored clothing is also cooler in summer. People living in hot countries have learned this and most commonly wear white. Light-colored clothing is warmer in winter and cooler in summer than dark clothing for the reason that white or light colors reflect or turn away the heat of the sun and so protect us from overheating in summer, and also protect us from cold in the winter by preventing the escape of the body heat.

We should be able to move as freely with our clothes on as without them. Clothing which is too tight to permit the body to bend with ease in all ways is too tight to be worn. When children grow fast, it often happens that their clothing, which of course does not grow with them as does the skin, gets so tight and small that it binds and squeezes the body most uncomfortably. Tight belts, tight collars, tight bands, tight waists, tight corsets, tight garters, all do great harm. If one wants his body to serve him well, he must provide it ample room in which to work.

The strong bones of the shoulders can bear the weight of one's clothing better than any other part of the body. To have one's clothing hang from the shoulders is the best plan. To fasten it about the waist merely is hard on the body, for its weight thus

Tight clothing harmful.

The weight of the clothes.

becomes a constant drag upon the delicate organs within the body in the vicinity of the waist. Sooner or later they will get so pushed out of place that harm will result.

In order to keep the body clean one must, of course, wear clean clothing. Garments worn next to the skin are very soon soiled by the perspiration. On this account there should be frequent changes of underclothing, even when it looks clean. Garments that can stand boiling can easily be made clean. For this reason cotton and linen underclothes are to be preferred. In cold weather, a thin cotton or linen suit with a light one of wool worn over it makes a good combination. Heavy, closely woven fabrics afford less warmth than light porous underwear, besides being less healthful and comfortable.

Daytime clothing should be taken off at night and hung open to the air, so that the moisture received from the body may dry out. Would it be best to hang it in a room other than the one used to sleep in? Would it be proper to hang it in a closed wardrobe or closet where air cannot reach it?

Garments worn at night should be aired every day, and so also should the bed coverings, which are really a part of our night clothing. What do you think of the practice of rolling up the clothing worn at night, and tucking it under the pillow during the day?

Underclothing absorbs more or less of the waste

matter thrown off from the body ; and even though aired daily, it becomes in a few days too soiled to be used again until made clean. When we lay such garments aside to await wash day, we should not leave them in heaps on the floor of the bedroom or clothes closet. Soiled clothing spoils the air of a room. It should be spread out or hung in some well-aired vacant room. Dresses and coats of cloth that hold dust should first be brushed and shaken out-of-doors before being hung in the clothes closet. Clean the shoes and rubbers out-of-doors before putting them away.

One depends so much upon his feet to support his body, when he walks, runs, jumps, skips, skates, and climbs that he cannot afford to cripple their usefulness. So he must be careful how he clothes them. Many children prefer to go barefoot in summer. Would they go barefoot in winter, too, were it not for the cold ? There are many people in warm countries who go barefoot all the time. They can walk very fast, and the soles of their feet become so hardened that they do not mind the rough roads. In Porto Rico, Mexico, and Egypt I have seen many old persons who had never worn a shoe ; but these are warm countries.

The feet feel most comfortable when unshod. It is well to go barefoot indoors so long as our feet are not cold. But it is not always safe to go out-of-
doors without some kind of foot covering. Shoes.

In certain parts of the country the soil is unclean, and full of the tiny hookworms that enter the body through

the skin of the feet, and cause a serious disease. In many places where children love to go, there is danger to bare feet from germs, and from rusty nails and pieces of glass, so that it often seems wisest to protect the soles with sandals, which is next best to going barefoot.

The proper shoe to wear is one that has the shape of the natural foot. People often wear shoes that are too narrow or too short. Do you think it is sensible to do this? With high and narrow heels one cannot walk or stand gracefully, and the muscles are strained and injured. Shoes with very thin soles ought not to be worn in cold or wet weather. Why? Tight shoes cause cold feet. They also make *corns*, and otherwise harm the feet.

The shoe should fit the foot. A too common way is to try to make the foot fit the shoe. You have perhaps heard how it used to be the fashion in China for the rich ladies to have small feet, and that to make them so they began when a girl was small, and her bones soft, to bend the toes under the foot. At the same time the foot was wrapped in so tight a bandage that it could not grow. The process was a very painful one, and it took a long time. In the end the foot was too deformed for use, and the unfortunate lady could only hobble; she could never move about freely as you do.

It is a good plan to use two pairs of shoes, wearing one pair one day and the other the next day. It costs no more to do this than to have but one pair. Shoes,

like other clothing, get foul with body waste ; and they should be given a chance to air and dry, so that they may be kept clean for wear. The stockings should be changed often, and always dried and aired at night.

Young Theodore, a friend of mine, had a hard experience with shoes. When he was ten years old, he coaxed his father to let him buy his own shoes for a year. After making him an allowance to spend for shoes for one year, his father told him he might buy them for himself. Now, Theodore had for some days envied a playmate who had a new pair of tan oxfords, and he wanted to get for himself a pair just like them. This he did as soon as he could. The tan shoes had pointed toes and somewhat higher heels than he had worn before. The high heels made him look taller, but they made his foot slide into the point of the shoe, which was narrow, and his toes were so cramped and pressed he found it almost impossible to walk, and his feet hurt him so he did not care to play. But they were pretty shoes, and they gave his feet so much style that he was quite proud of them. At times he was tempted to take them off because they pinched his feet so badly, but he was afraid his sister would laugh at him. So he wore them until night, although he suffered from them. When he took them off, his toes looked red and bruised. There was a sore spot on one foot and a blister on the other.

You might suppose that after one day's trial he would not again try wearing those shoes ; but he did.

Some one told him that new shoes always hurt the feet, and that they had to be worn a few days to get them "broken in." So he kept wearing the shoes and suffering. By and by he got his feet squeezed into the shape of his shoes — you see it was his feet that had to be "broken in" — and after a time he got some corns on his feet and an ingrowing toe nail that were painful.

REMEMBER: Health and comfort demand that one should wear clean, dry, porous, and loose-fitting garments. Very tight-fitting shoes, collars, and the like should be avoided.

HEALTH PROBLEMS

1. Take a thermometer which registers about 32° outdoors. Put it next to the body, inside the clothing, and notice how quickly it rises. Where does the heat come from? Why does one get so warm when he works hard or runs fast?

2. Put a piece of woolen and of cotton cloth against the face or any part of the body. Which feels the warmer? Why?

3. Do you think people who wear heavy mufflers about the throat in winter avoid having sore throat? Why?

4. Is it well to wear heavy ear mufflers in moderately cold weather? Why?

5. Why do people use storm windows in winter — to keep out the cold or to keep in the heat?

6. Why do people use hollow tile in the walls of their houses when they build them?

7. On a very hot day, people often put water on the face, hands, and neck, and let it dry in the air. Why?

8. Why do we so often speak of *wet* days as *cold* days?

9. Feel a thick, hard-woven suit of underwear and a loosely woven, fluffy one; which feels the warmer? Explain.
10. Which is warmer, a heavy, hard quilt, or a light, fluffy one? Why?

REVIEW QUESTIONS

1. Where does the heat which makes the body warm come from? Is it all kept in the body?
2. What is the chief reason for wearing clothes?
3. What kinds of material best keep the heat of the body from escaping? What kinds permit the heat to escape readily?
4. Can the skin be trained to endure a good deal of cold? How?
5. Why do many people take "cold" easily in winter?
6. How should one dress when going out in cold or wet weather?
7. What is the objection to wearing raincoats, rubbers, and very thick, heavy clothing all the time?
8. Does the color of clothing make any difference in regard to its warmth or coolness?
9. What is the objection to wearing tight belts or collars or bands?
10. What is the best cold-weather combination in under-clothing?
11. What should be done with daytime clothing at night?
12. Why should one be careful to clothe the feet properly?

CHAPTER XIX

PROTECTING THE BODY'S HEALTH

WE have seen that people become sick from many causes. One person may become ill from eating too much, or from wearing clothes too tight, or from abusing his body in some other way. Another becomes sick from not keeping his body clean or from not keeping it in good poise ; still others may become sick from bacteria or germs that get into the body and live there.

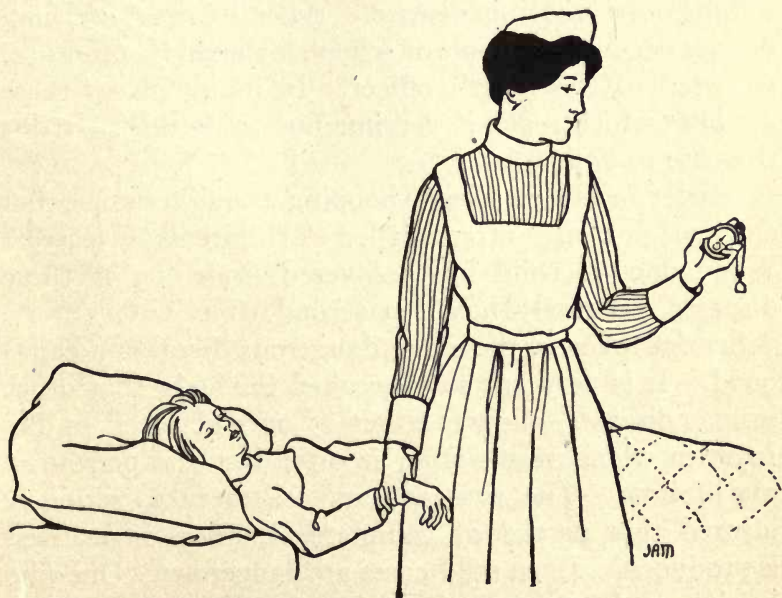
Nearly all these bacteria come from the bodies of the sick. They get into the air, and into the water and food in various ways. If one then breathes this air, or drinks the water or eats the food that contains bacteria, he too may become sick with the kind of disease they cause. Diphtheria, typhoid fever, smallpox, measles, whooping cough, infantile paralysis, pneumonia, tuberculosis, cholera, and grippe are the names of some of these diseases. They are all catching. Each is produced by a special sort of bacteria. The kind that causes one disease will not make a person sick with any other disease.

All these diseases are dangerous, and they should be avoided as one would avoid a lion or any other

ferocious animal. When any one is sick with a catching disease, all persons who are not needed to give him proper care should keep away from him.

Most towns and cities have one or more persons, called health officers, whose business it is to try to prevent these catching diseases. When any one is ill with a dangerous disease like diphtheria, measles, scarlet fever, typhoid fever, or smallpox, the health officer puts a sign on the house. When people see that sign, they know it to be a warning, and they should keep away.

A lady whose little daughter had scarlet fever did not want a sign put on her house, so she told no one



MARY IS VERY SICK WITH A DISEASE SHE CAUGHT FROM A PLAYMATE.

what ailed the child. Other children came to the house. The little girl, not being very ill, was permitted to play with them. A few days afterward several of these children became very sick with scarlet fever. It cost their parents much money to provide the care their illness required. They missed school and all the good times their playmates were having. One child lost his hearing as a result of his illness, and each one suffered to a greater or less degree. All for the lack of a card which would warn people that there was a dangerous disease in the house !

It is our duty to do all we can to protect others as well as ourselves from disease. When a case of catching disease occurs in a home or school, it should be promptly reported to the health officer. In many places there are laws which make it a crime not to do this. Is this the case in your town ?

Scarlet fever, measles, whooping cough, mumps, and chicken pox are often called "children's diseases." When once a child has recovered from one of these diseases, he rarely has it a second time.

Scarlet fever is the most dangerous disease of childhood. It is very apt so to weaken the body that other serious diseases follow it either at once or later in life. Injuries which result from it often last the person all his lifetime. The eyes or ears are often so seriously injured that partial or complete blindness or deafness is produced. Even mild cases are dangerous. One who has it must be given the best of care. This is not always

possible at the child's own home. In many places special hospitals are provided for the care of those ill with catching diseases. This is a boon to the sick one, and likewise a means of protection for well people.

Scarlet fever is spread by discharges from the throat and nose and by scales which fall from the skin. Generally it takes six weeks for the person to get so well that there is no danger of giving the disease to others. Even though the patient feels quite well, it may not be safe to allow him to mingle with his playmates because he may still carry with him some living scarlet fever germs which might give rise to the disease in others. So a person who has had scarlet fever must wait until he is released by the health officer.

Scarlet fever germs may be carried from the sick to the well on clothing, books, papers, and things worn or handled; they may lodge too in the room where the sick one has been. To prevent other cases these germs must be completely destroyed.

Measles is another dangerous disease against which the same precautions as with scarlet fever are necessary. It is communicated in a similar manner. It may leave behind it also a whole train of dread diseases.

It is most important that children avoid all catching diseases. A sore throat is apt to be the first bad feeling in the case of scarlet fever and some other serious diseases. It is wise to beware of any person with a sore throat.

The mouth is the gateway through which many

germs get into the body. Many germs leave the bodies of the sick through this same gateway. Do you think it a wise thing for people to kiss one another on the mouth? Do you think it right to allow all sorts of people to kiss a baby?

Germs enter through the mouth.

A sick man drinks from a public drinking cup. He may leave disease germs from his mouth on the rim of the cup. Then a little girl comes for a drink, and the germs get a fine chance to slip into her mouth while she is drinking.

If you are thirsty when at play, go to one of the bubble fountains that you can drink from without a cup. If you must use a public drinking cup, put both lips into it, and be careful not to touch the rim. Should you always take your own drinking cup to school with you? Why?

Suppose that when you get to school you find that you have forgotten your pencil. Should you borrow one from a classmate? Suppose you borrow one from a pupil who has a habit of putting his pencil in his mouth, and suppose you have the same habit. What may be the result? Diphtheria and other germs have been found on pencils. They are often carried from one child to another in this manner.

Think over this case: You go into the Public Library, and sit down to read in the Children's Room. The first book you pick up has dirty thumb marks on the pages. There is a boy near you, wetting his thumb in his mouth every time he turns the pages. You say:

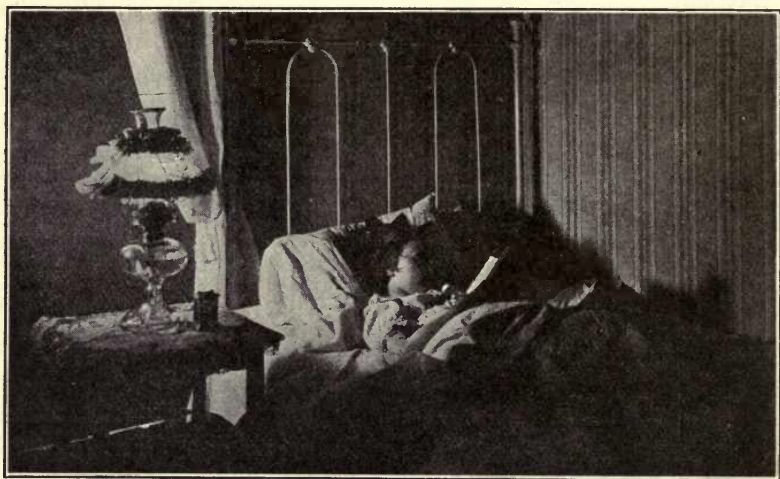
"This is not a nice habit. It makes the book dirty." But is this the worst thing about the boy's dirty habit? Five thousand bacteria were found sticking to the leaf of a book, from one thumb that had been wet with saliva. Might they pass from the book to your hands as you turn the leaves? What should one do in a case like this?

From door knobs, car rails, and straps, and other things that everybody touches, you may gather disease germs on your hands. If you are in too much of a hurry to wash your hands before dinner, you may give the germs a good opportunity to pass into your mouth with your food. Is it well to keep the hands away from the face and not rub them over the face? Why? Sore eyes and pimples on the face may come from hands that have bacteria on them.

A man with disease germs in his mouth spits in the street. A little boy comes along and gathers up some of the germs along with the dirt which clings to his boots. When he goes home he does not stop to wipe his boots on the doormat. He goes into the sitting-room, and some of the dirt on his boots is wiped off on the rug. His little sister is playing on the floor. The germs get on her hands; she puts her finger in her mouth and the germs go with it. What may be the result of this?

When people have certain diseases, they distribute disease germs wherever they go, unless they are very careful. A great many germs are scattered about by

people's spitting on the sidewalk or in public places. This is so dangerous that in some towns and cities there are laws against spitting, and people who are caught expectorating on the walk are fined or put in prison. Is this just, do you think? In cars and public buildings you may often see the sign: "Don't spit."



READING LATE AT NIGHT IN A POSTURE LIKE THIS IS LIKELY TO WEAKEN ONE
SO THAT HE CANNOT RESIST DISEASE.

Is this a rule every one should obey even if there are no laws forbidding it?

A little sick girl was shut in the house away from all her playmates. It was not safe for them to visit her. One of her friends sent in her pussy to amuse and comfort the sick child. When the child was better, the kitten was sent home. After a few days her

mistress noticed that kitty was not well. She petted and fondled the kitten. Soon the child herself was taken ill with the same disease that her little friend had. She herself had not been near the sick child. How did she catch the disease? We often hear cats sneezing, and see their eyes running just as ours do when we have a cold. Even when they are not sick themselves, they often carry disease germs in their fur. Is it a good thing to nurse and fondle cats? Do you always know where your pussy goes visiting when she is out of your house? Is it best not to run any risks?

Formerly no one knew that colds and influenza were catching, but now it is known that in sneezing and coughing a person with a cold sends out into the air around him little droplets of moisture full of germs which those near him may breathe in and get the same disease. The same is the case when one has influenza. Quite often children have these diseases and although they do not feel as well as usual continue to go to school. What do you think might likely happen?

This is what did happen in a school I know about. It was at a time when influenza was very prevalent. There were over a thousand pupils who attended the school. On one floor this plan was carried out: As soon as a child in any room showed symptoms of influenza he was sent home and at night that room was cleansed in a way that left no germs behind. As a result less than two dozen of the pupils on that floor took the disease. On the other floor no such care was

taken and about two thirds of the children suffered with influenza.

From one single case of a catching disease, if it is not well guarded, there may follow hundreds. Two boys
Guarding I knew had whooping cough. They did not
against feel so very sick. It seemed too bad for them
contagion. to miss their lessons, and get behind in their classes, so their parents allowed them to go to school. Very soon nearly all the children in that school who had not already had it were having that disease. Should those boys have been kept at home? Why? Whooping cough kills 10,000 children in the United States every year. Those who do not die from it are likely to have their bodies so weakened by it that they will be unable to resist pneumonia and tuberculosis. Do you think any one having such a serious disease should be willing to be the cause of other people getting it?

Stand on the dock when a steamer is leaving, and you are sure to see a lot of waving handkerchiefs. People often signal to each other in this manner. If the handkerchiefs have been used, they will be likely to contain germs from the nose and mouth. Each wave of the handkerchief may send out into the air a little shower of disease germs. It is important to change one's handkerchiefs often, even when one is well. Why? Should one ever flourish a soiled handkerchief in the air? Sick people should use paper handkerchiefs that can be burned. Why? The Jap-

anese, who are very clean in their habits, and a very healthy people, always use paper handkerchiefs. The discharge from the nose when one has a cold very quickly makes a cloth handkerchief so moist that it is of no further use. A girl I once knew used to dry her handkerchiefs on the steam coils so she could use them a second time. Do you think this a safe way to do? Is it wise to wipe the eyes with a handkerchief that has been used for the nose? Those who care for babies frequently use their own handkerchief for the little ones. Do you think this a safe plan?

Probably the disease that kills more people than any other is consumption, or tuberculosis. One tenth of all deaths is due to it. It is so common that in this country one person dies from it every three minutes. Tuberculosis most often affects the lungs, although it occurs in other organs of the body. When the lungs are diseased, the sick one coughs, and sometimes raises much foul matter. This swarms with the germs that are the cause of the disease. If this falls upon the floor, carpet, or bedding, the germs get into the air of the house, and whoever breathes it may also get tuberculosis.

Tuberculosis, the deadly disease.

If the sputum (foul matter from the lungs) is discharged upon the ground or sidewalk, it is likely to be trodden under foot, and thus carried about, distributing germs in new places, or it may become dry and mingle with the dust which may be borne by the wind, scattering germs wherever the dust flies. A scientist found

large numbers of tuberculosis germs on grapes that grew in a vineyard near a dusty highway. Tuberculosis germs are scattered too by the tiny droplets which are sprayed out into the air every time a sick person coughs or sneezes.

Whatever a person suffering from tuberculosis eats with or in any way uses about his mouth is sure to carry germs, unless it is thoroughly cleansed. As likely as not, too, when a sick person spits upon the floor or sidewalk, flies walking over the foul matter get it on their wings and feet, and so carry some of its germs along to the next person or thing upon which they alight.

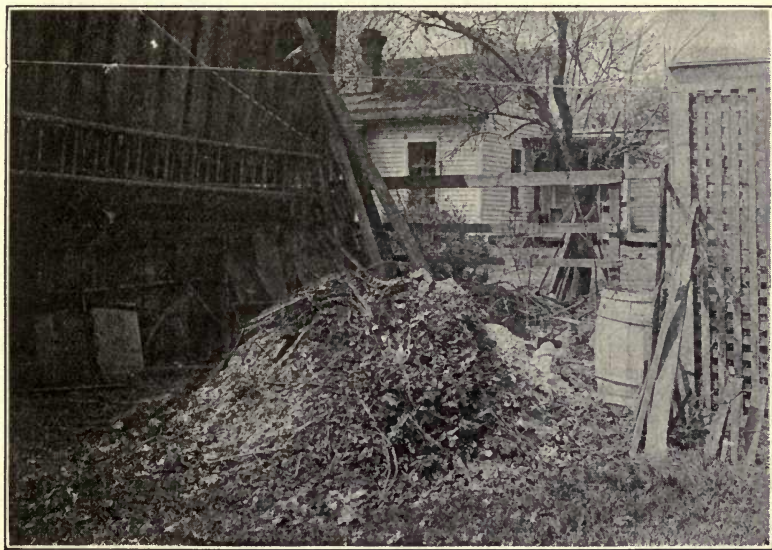
With all these ways of distributing the germs of tuberculosis, see how easy it is for one person to get them from another, if the sick person is not most careful.

A wise program for the sick is: (1) To hold a cloth before the mouth when coughing. The cloth should be burned thereafter; (2) To spit into squares of soft cloth or paper napkins, using each but once and afterward burning it; (3) To use a pocket cuspidor or some vessel filled with a disinfectant; (4) To use the same dishes at each meal, and to wash them separately from those used by other people; (5) To wash the hands often; (6) To avoid kissing.

Care in promptly destroying all germs that come from consumptive people would save thousands of people every year from getting this disease. Careless people who are ill with tuberculosis are to be feared.

Sometimes it happens that neither sick people nor their friends understand about the precautions needed to protect well people. So you see it is most important for every one to *know* about this disease, and how to prevent its spread. When tuberculosis germs are breathed into the lungs of a perfectly healthy person, they are likely soon to be killed by

Preventing
tuberculo-
sis.



THIS IS A GOOD PLACE FOR THE BREEDING OF DISEASE GERMS.

the brave little white blood cells of which we learned in Chapter VIII. It is the one who is out of health or run down from one or another cause, such as lack of proper food, or of sleep, or of fresh air, that most often gets tuberculosis. The use of alcohol and tobacco, be-

cause they weaken the body, make one very liable to get tuberculosis if he breathes in the germs. The surest course to pursue in order to avoid getting tuberculosis is to practice health habits, and to keep the body so well and strong that it can resist disease. Mention the health habits that will protect the body from this disease.

The tuberculosis germ has a good chance to gain a hold in the body when a person is having a cold. It is



FLIES, DUST, AND THE LIKE ALWAYS BRING DISEASE AFTER THEM.

wise therefore never to neglect a cold. Taken at the beginning, tuberculosis can be cured. Rest, good food, and outdoor air and sunshine are the four best ways to bring about a cure. Physicians say the best thing to do is to live out of doors in the open air and sunshine twenty-four hours of each day. Why should this be good for a person sick with tuberculosis?

One who has a cough for a long time ought to have an examination made. The health department in most

cities will make an examination free. It is very important for one who has tuberculosis germs to find it out as soon as possible so that he may take steps to be cured. He should find it out, too, so that he may protect those among whom he dwells, and may make himself a safe person to associate with.

HEALTH PROBLEMS

1. Place a piece of glass about four inches away from your mouth when you cough or talk loud, and notice whether anything appears on it. Explain.

2. Suppose your classmate has a "cold in his head," and sneezes a good deal very near you. Are you in any danger? Explain.

3. Sometimes a person gets in the habit of "clearing his throat" with his mouth open when others are near by. Should he do this? Why?

4. If one must cough when others are near by, is there any way he can prevent the spray from his throat and lungs being sent out into the atmosphere? Explain.

5. Tell five ways in which harmful bacteria or disease germs may get into the body.

6. Find out what the Board of Health or the physicians or the people in the place you live are doing to get rid of some catching disease.

7. Has your school ever been closed on account of some "epidemic"? If so, what was it? Why was the school closed?

8. Suppose you knew of a family in which there was a case of scarlet fever, but the family would not tell physicians about it so that they would be "quarantined"? What would you do? Why?

9. Should every well person help the health officers as much as he can to prevent people from spitting on street cars, sidewalks, in public buildings, etc.? Why?

REVIEW QUESTIONS

1. Name several causes of sickness.
2. What is the meaning of *bacteria*?
3. Where do the bacteria that make one sick come from first?
4. How are they carried from one body to another?
5. What are some of the diseases caused by bacteria?
6. What may happen to well children playing at the house of a child who has such a disease as scarlet fever?
7. What is the gateway through which many germs enter the body?
8. Is there danger in using a public drinking cup?
9. Is there any danger from different children using the same lead pencil?
10. Is there any danger from eating food without first washing the hands?
11. Is there any danger from rubbing the eyes with the hands?
12. Is there any danger from people spitting on the street or in other public places?
13. Is there any danger from children fondling kittens?
14. Is there any danger to pupils in school from a child who has a hard cough?
15. Is there any danger from people waving handkerchiefs about in the air?
16. What is the disease known as tuberculosis?
17. How is tuberculosis spread among the people?
18. What care should one who is suffering with tuberculosis take?
19. What do the white blood cells do to save one from tuberculosis and other diseases?
20. How should one live in order to keep his white blood cells in good condition?
21. What kind of living may weaken one so he cannot fight tuberculosis and other diseases?
22. How can one find out whether he has tuberculosis?

GLOSSARY

KEY TO PRONUNCIATION

ā, as in **āle**; ä, as in **sen'äte**; â, as in **câre**; ǣ, as in **ǣm**; ä, as in **ärm**; á, as in **ásk**; a, as in **fí'nal**; ē, as in **ēve**; ĕ, as in **ĕ-vent'**; ě, as in **ěnd**; ě, as in **fĕrn**; e, as in **re'cent**; ī, as in **īce**; ĭ, as in **ĭ-de'a**; ĩ, as in **ĩll**; ō, as in **ōld**; ȝ, as in **ȝ-bey'**; ô, as in **ôrb**; ȝ, as in **ȝdd**; ū, as in **ūse**; ũ, as in **ũ-nite'**; ũ, as in **ũp**; û, as in **ûrn**; ȳ, as in **pĩt'ȳ**; ōō, as in **fōōd**; ōō, as in **fōōt**; ou, as in **out**; oi, as in **oil**.

A

abdomen (ăb-dō'mĕn). The middle part of the body, between the thorax and the pelvis. The cavity which contains the stomach, bowels, and other organs.

adult (ă-dułt'). A person who is fully grown.

alcohol (ăl'kô-hôł). The intoxicating element of fermented or distilled liquors.

alkaloid (ăl'ká-loid). Bitter substances found in nicotine, quinine, morphine, etc., that affect the nervous system strongly.

apparatus (ăp'pa-ră'tűs). A collection or set of implements or organs for a given duty, as the vocal apparatus for making and regulating the voice.

artery (ăr'tĕr-ȳ). One of the vessels or tubes which carry either venous or arterial blood from the heart. They have thicker and more muscular walls than veins and are connected with them by capillaries.

artificial (ăr'tĩ-fish'al). Not natural; made by human skill and labor.

B

backbone (băk-bôn'). The column of bones in the back which sustains and gives firmness to the body, sometimes called the spine, or spinal column.

bacteria (băk-tĕ'rĩ-ă) (pl. of bacterium). Living bodies too small to be seen by the naked eye. Certain kinds are harmful to the body; other kinds are protections.

- bellows** (běl'lūs). An instrument which by the opening and closing of its sides draws in the air through a valve and expels it through a tube, for blowing fires, ventilating mines, or filling pipes.
- beverage** (běv'ēr-āj). Anything used as a drink, usually applied to drink artificially prepared, and of agreeable flavor, as coffee.
- blood vessel** (blūd' vēs'sěl). Any vessel or canal in which blood circulates, as an artery or vein.
- brisk** (brīsk). Lively; spirited; quick.

C

- canal** (kā-nāl'). A tube or duct for conveying food or liquid, as the alimentary canal.
- capillary** (kāp'il-lā-rŷ or kā-pīl'lā-rŷ). A tiny thin-walled tube that connects a vein and an artery.
- carbon dioxide** (kā'r'bōn dī-ōks'īd or īd). A gas formed in the lungs when one breathes.
- cartilage** (kā'r'tī-lāj). Elastic tissue or gristle connecting muscles and bones.
- cavity** (kāv'ī-tŷ). A hollow place, as the abdominal cavity.
- cell** (sěl). One of the minute parts of which most of the various tissues and organs of animals and plants are composed.
- chamois** (shām'mŷ). A soft leather made from the skin of the animal, the chamois.
- channel** (chăn'něl). A tube through which water or any liquid passes.
- chest** (chěst). The part of the body inclosed by the ribs and breast bone; also called the thorax.
- chicken pox** (pōks). A contagious disease attended by itching and peeling skin in the last stages. Unless care is taken to prevent, the patient is left with small scars or pits on his body.
- cholera** (kōl'ēr-ā). A dangerous disease, very contagious, originating in filth.
- circulate** (sēr'kū-lāt). To move in a circle.
- colander** (kūl'an-dēr). A dish with little holes for straining liquids, mashing vegetables, etc.
- combustion** (kōm-būs'chŭn). Burning up, as when wood or coal burns to ashes in a grate.
- competitive** (kōm-pēt'ī-tīv). An adjective applied to a contest between two or more persons, as in a race or a spelling match, and so on.
- contract** (kōn-trākt'). To draw together; to shorten, as the muscles of the arm contract when the arm is bent.

cramp (krămp). To squeeze, to prevent an organ from having free action.

D

decay (dě-kā'). To waste away; to rot; to perish.

decompose (dě'kōm-pōz'). To rot; to decay.

deformity (dě-fōrm'ĩ-tŷ). Any unnatural shape or form; distortion; irregularity of shape or features; ugliness.

dermis (dēr'mis). The deep sensitive layer of the skin beneath the scarfskin, or epidermis.

diaphragm (dĩ'ă-frăm). The muscular partition separating the cavity of the chest from that of the abdomen.

digest (dĩ-jěst'). To separate the food in its passage through the alimentary canal into its nutritive and non-nutritive elements.

digestion (dĩ-jěst'chŭn). The process of preparing the food to nourish the blood.

diphtheria (dĩf-thē'rĩ-ă). A very dangerous contagious disease in which the air passages, especially the throat, become coated with a false membrane.

disc (dĩsk). A flat round plate.

discus (dĩs'kŭs). A circular plate of some heavy material intended to be pitched or hurled as a test of strength and skill.

disease (dĩz-ēz'). Any change in the state of the body or of an organ, causing pain and weakness; illness; sickness.

distillation (dĩs'til-lă'shŭn). The separation of the parts that have the power of evaporating from the more fixed parts of a substance; vaporization; condensation.

E

efficiency (ěf-fish'en-sŷ). The power of doing the greatest amount of work with the least waste in a given time.

enamel (ěn-ăm'ěl). The very hard tissue entering into the composition of the teeth.

epidermis (ěp'ĩ-dēr'mis). The outer layer of the skin; cuticle; scarfskin.

erect (ě-rěkt'). Upright; not leaning or bent.

evaporate (ě-văp'ô-răt). To change from liquid into vapor, as when water evaporates in the sun.

experiment (ěks-pěr'ĩ-ment). An act or operation undertaken in order to discover some unknown principle or effect or to test, establish, or illustrate some suggested or known truths; practical test; proof.

F

fermentation (fě'r'měn-tā'shŭn). The change that takes place in fruit juice and the like when alcohol is formed.

flabby (flăb'bŷ). Hanging loose by its own weight; not firm or strong.

fluid (flū'id). A body whose particles move easily among themselves and do not tend to remain in any one form. Not solid, as water, milk, etc.

foundation (foun-dā'shŭn). That upon which a thing is supported or built, as the foundation of a house.

framework (frām'wûrk). The skeleton upon which the body is hung.

G

germ (jěrm). That which is to develop an individual; the earliest form under which an organism appears.

grippe (grĭp). The influenza or severe "cold in the head."

gymnastics (jĭm-năs'tiks). Exercises taken regularly.

H

habit (hăb'it). A fixed way of acting or carrying one's body.

hookworm (hoōk'wûrm). A tiny animal that gets into the blood through the skin, makes its way to the bowels, and multiplies.

I

infantile paralysis (ĭn'fan-tĭl pâ-răl'ĭ-sĭs). A disease in an infant which results in loss of power of locomotion.

influenza (ĭn'flū-ĕn'zâ). A disease characterized by acute nasal catarrh, or by inflammation of the throat or the bronchi, and usually accompanied by fever.

J

joint (joint). The place at which the bones unite or connect.

L

ligament (lĭg'ă-ment). A tough band which unites bones or forms joints.

loathsome (lōth'sŭm). Exciting disgust, especially because of filthy nature; sickening.

M

measles (mē'z'lz). A contagious disease marked by the appearance on the third day of a rash on the skin.

- microbe** (mī'krōb). An animal body so small that it can not be seen by the naked eye.
- microscope** (mī'krō-skōp). An instrument for making an enlarged image of an object which is too small to be seen by the naked eye.
- mucous membrane** (mū'kūs mēm'brān). The membrane lining passages and cavities which communicate with the exterior.
- mumps** (mūmps). A contagious disease which produces a swelling of glands in the neck.

N

- nicotine** (nik'ō-tin). A substance which is found in tobacco. It is poisonous.
- nostrils** (nōs'trils). The openings of the nose through which the air we breathe passes in and out of the lungs.

O

- observant** (ōb-zērv'ant). Watchful; on the alert to notice objects and happenings.
- opium** (ō'pī-ūm). Poppy juice, used as a drug.
- overtax** (ō'vēr-tāks). To do more than is good for one.
- oxygen** (ōks'ī-jēn). One of the elements of which air is composed, and which is necessary for life.

P

- particle** (pār'tī-k'l). A minute part of matter; an atom.
- peevish** (pē'vish). Habitually fault finding; easily vexed or fretted; hard to please.
- permanent teeth** (pēr'mā-nənt tēth). The teeth which remain after the temporary teeth have decayed.
- perspiration** (pēr'spī-rā'shūn). Sweat.
- perspiratory glands** (pēr-spīr'ā-tō-rŷ glāndz). The glands through which the perspiration comes to the surface of the skin.
- pneumonia** (nū-mō'nī-ā). A disease of the lungs.
- pores** (pōrz). Minute openings or passageways, especially in the skin.
- porous** (pōr'ūs). Full of pores.
- posture** (pōs'tūr). The position of the body.
- precaution** (prē-kā'shūn). Looking ahead to ward off evil or to secure good.

pulmotor (pul'mō'tēr). An instrument by means of which the lungs of a dying person may be filled and emptied with regularity.
pulse (pŭls). The beating of the heart or blood vessels, usually felt at the wrist.

R

relax (rê-lăks'). To make lax or loose; as to let the muscles become slack.
reservoir (rěz'ēr-vwôr'). A place where anything is kept in store; in the heart, where blood is kept in store.
respiration (rěs'pī-rā'shŭn). Breathing.

S

sac (săk). A cavity or bag, usually containing fluid, and either closed or opening into another cavity or to the exterior.
scarfskin (skärf'skīn'). The outside layer of skin, or epidermis.
scarlet fever (skär'lět fē'vēr). A contagious disease in which the patient has a rash of red on his body, that causes his skin to peel about the seventh day after the rash appears.
secrete (sê-krēt'). To separate a fluid from the blood and elaborate by the process of secretion; to hide, to conceal.
shambling (shăm'bling). Awkward, irregular walking or running.
shriveled (shriv'vl). To draw, or be drawn, into wrinkles.
sickly (sīk'ly). Somewhat sick; disposed to illness.
skeleton (skěl'ê-tŭn). The firm or hardened framework on which the body is hung.
skull (skŭl). The skeleton of the head, including the brain case, or cranium, and the bones and cartilages of the face and mouth.
smallpox (smăl'pöks'). A contagious disease, which causes the skin to peel and leaves deep pits, or scars.
sneezing (snēz'ing). The act of violently forcing air through the nasal passages while the cavity of the mouth is shut off from the pharynx by the approximation of the soft palate and the base of the tongue.
spinal column (spī'nal kōl'ŭm). The backbone.
spine (spīn). The backbone, or spinal column.
sputum (spŭ'tŭm). Saliva; that which is expectorated; as when one has a cough.
symptom (sĭmp'tŭm). Any affection which accompanies disease.
temporary teeth (tĕm'pō-rā-rŷ tĕth). Teeth that grow first, and come out to make place for the permanent teeth.

- tendon** (tĕn'dŭn). A tough cord, bundle, or band uniting a muscle with some other part; sometimes called sinew.
- trunk** (trŭnk). The part of the body not included in the head and limbs.
- tuberculosis** (tŭ-bĕr'kŭ-lŏ'sis). A disease especially of the lungs, sometimes called consumption.
- typhoid fever** (tĭ'foïd fĕ'vĕr). Of or pertaining to typhus, which is a contagious fever lasting from two to three weeks.

V

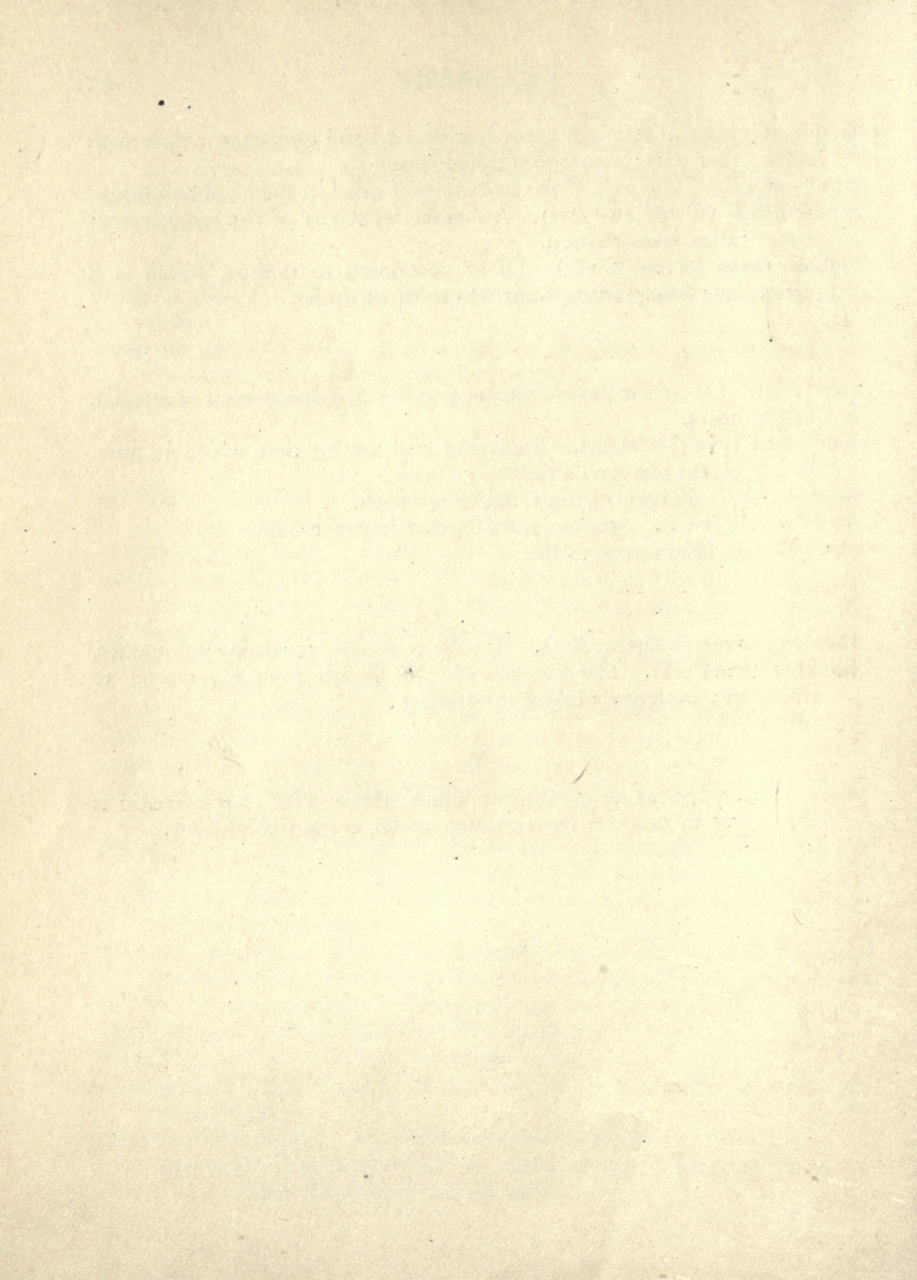
- vein** (vān). One of the vessels which carry blood, either venous or arterial, to the heart.
- ventilation** (vēn'tĭ-lā'shŭn). Replacing foul air by that which is pure, in any closed place, as a house, a church.
- vigor** (vig'ĕr). Force; energy; active strength.
- vigorous** (vig'ĕr-ŭs). Strong; full of active force; robust.
- vital** (vĭ'tal). Necessary to life.

W

- whooping cough** (hōōp'ing kəf). A violent cough, returning frequently.
- windpipe** (wĭnd'pĭp). The passage for the breath from the larynx to the lungs; sometimes called the trachea.

Y

- yeast** (yĕst). The name given to a plant whose chief characteristic is the power to produce fermentation under certain conditions.



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